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144 N. Clark Street.



## IRON CLAD PAINT.



Trade-Mark Patented.  
This Paint is used by nearly all the  
Railroads in the Country.

Used by L. S. & M. S. Watson Ry. Co., C. & O. & I.  
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ral R. Ry. Co., Canada Southern, Mobile & Ohio, S. O.  
& Mobile, Macon & Brunswick, Penn. R. Ry. Co., M.  
& S. P. Ry. Co., A. & S. Ry. Co., R. & D. Ry. Co., Carolina  
Central Ry. Co., C. & S. L. Ry. Co., F. & E. R. Ry. Co., L. S.  
& W. Ry. Co., K. & D. M. Ry. Co., C. & A. R. Ry. Co., L. S.  
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Ry. Co., etc., etc.

IRON CLAD PAINT CO., Cleveland, Ohio.



Established 1858.

THE  
Prince Manufacturing  
COMPANY,  
SOLE MANUFACTURERS OF

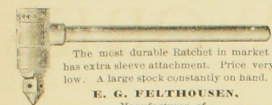
## Prince's Metallic Paint.

The best Paint in the World for  
Iron, Tin and Wood.

Send for a Circular to

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## Patent Combination Ratchet Drill.



The most durable Ratchet in market;  
has extra sleeve attachment. Price very  
low. A large stock constantly on hand.  
E. C. FELTHOUSEN,  
Manufacturer of  
HAND & AUTOMATIC CYLINDER OIL PUMPS,  
Ball and Wheel Gauge Cocks, Flue Cleaners, etc.  
Salesrooms, 29 and 61 Main Street;  
Factory, 72-80 Washington Street,  
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The prices of Worthington Steam Pumps and Boilers com-  
bined, for Railway Tank service, have been reduced. The combi-  
nation embodies some improvements that have been made subject of  
letters patent, and the above reduction is made in order to insure  
its speedy adoption. The pumps are used on nearly all of the  
principal Railroads in this country and Canada. Send for Cir-  
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HENRY R. WORTHINGTON.

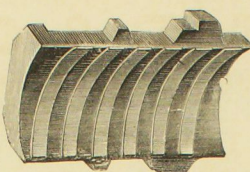
NEW YORK,  
239 Broadway.

BOSTON,  
70 Kilby St.

ST. LOUIS,  
707 Market St.

## The Leroy Journal Bearing Co.,

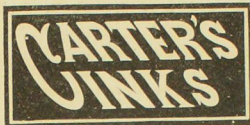
145 BROADWAY, NEW YORK CITY.



Has the SOLE RIGHT to manufacture and sell  
JOURNAL BEARING BRASSES under Let-  
ters Patent issued to T. V. Leroy, Nov. 18, 1879,  
and reissued Feb. 17, 1880, Aug. 16, 1881. Testi-  
monials, which may be seen at the office of  
the Company, show our brasses to be the Best  
and Most Economical in use. We claim that  
their use saves one-third in oil, and two s.s. will  
outwear three of any other brasses. Those in-  
terested in Railroads will do well to examine.  
Address

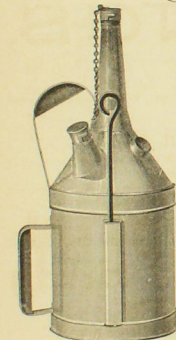
GEO. W. McLEAN,  
President.

ANNUAL SALES 3,000,000 BOTTLES!



CARTER, DINSMORE & CO., BOSTON AND NEW YORK.

## NOYES' Patent Liquid and Condensed COOLER.



For Cooling Railroad Car and Steamboat Journals and  
Bearings of all Kinds, and for Mix-  
ing with Other Oils.

The attention of those who are running heavy Journals is respectfully in-  
vited to the above Liquid Cooler. It has been successfully used for upward  
of ten years, and is constantly growing in favor as its merits become known,  
and we are confident that practical men cannot fail of being convinced that  
our preparation deserves their candid attention. What we claim for it is:

That it will Cool a Hot Journal When in Motion  
and extinguish the flame when the box is on fire; that its use will, in a great  
measure, prevent the occurrence of a hot journal, and save the expense,  
delays and annoyances incident thereto; that it will eliminate the heat  
from a journal at a temperature greatly below the point required to melt  
the babbit, preventing the accumulation of heat, and by a timely applica-  
tion save it from destruction; that its non-inflammable elements "where  
waste is used permeate the waste and prevent its taking fire; that it keeps  
the journal smooth and polished, preventing unnecessary friction; that its  
combination is based upon true scientific principles, which renders it im-  
possible to fail in its results, and is the

Only Preparation that will Cool a Hot Journal  
while it is in motion, as attested by certificates below; that one thorough ap-  
plication on a hot journal will do more execution in cooling than the con-  
stant application of water for half an hour besides doing it evenly and  
without loss of time.

Every Railroad Train or Steamboat  
should have a can of the Liquid Packing on board, with the directions for  
its use pasted upon it, and thus have always at hand the means of effectually  
cooling a hot journal, and thereby avoid the expense, danger and trouble  
from this cause.

## WHAT RAILROAD MEN SAY OF IT.

SALEM, Aug. 7, 1872.  
MR. P. NOYES.—Dear Sir: I have been using your  
Liquid Packing for cooling car journals for some  
time past, and have been well pleased with it. I have  
had occasion to use it a number of times, under full-  
man care, and it has been a complete remedy in  
every case of hot journals.

Every train should be provided with it, as it is a  
saving of time and expense in the running of trains,  
provided it is applied and cared for according to  
directions for using.

Yours truly,  
J. P. SOKERY,  
M. C. R. Eastern Railroad.

SALEM, Aug. 28, 1880.  
I can recommend Noyes' Liquid Cooler as an ex-  
cellent article to carry on trains for use in case of hot  
journals, which it cools without injury to the jour-  
nals, more effectively than anything I know of.

J. D. HILLMAN,  
M. C. R. Eastern Railroad.

Our Liquid Cooler is now in use, and has been from one to eight years, upon the following roads, and  
we have numerous recommendations from the M. & N. Ry. Co., Boston & Maine R. Ry., Boston & Lowell R. Ry., Inter-  
colonial R. Ry., Boston, Concord & Montreal R. Ry., Fitchburg R. Ry., Eastern R. Ry., New York & New Haven  
& Hartford R. Ry., New York & New England R. Ry., Connecticut River R. Ry., Delaware & Hudson Canal  
Co., Old Colony.

In ordering state whether it is desired for general Lubricating or Cooling. The  
condensed is sold, especially for Lubricating, by the Pound, and the Liquid by  
the Gallon, as low as any article of the quality in the market.

SEND FOR A BARREL. NO CHARGE UNLESS IT DOES ALL WE STATE.  
MANUFACTURED BY THE

NOYES MANUFACTURING CO., P. Noyes, General Manager,  
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We are Sole Agents for the Swift & Muller for Locomotives, and are Agents for the Crosby Patent  
Car-Side Holder and Lock.

## CLEVELAND MALLEABLE IRON CO., CLEVELAND, OHIO

OIL BOX COVERS,  
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CAR DOOR HANGERS,  
CAR DOOR FASTENINGS,  
CORNER IRONS,  
SLEEVE NUTS,  
DRAW RAIS,  
TRANSOM PLATES,  
MILLER HOOK CENTERS,  
CAR SPRING CASTINGS,  
SWITCH PLATES,  
JACK CASTINGS,  
AND GENERAL R. R. WORK.

ALL MADE OF  
REFINED AIR FURNACE MALLEABLE IRON.

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IMPROVED SINGLE OR DOUBLE CYLINDERS—SINGLE  
OR DOUBLE FRICTION DRUMS OR REVERSIBLE  
LINK MOTION

## HOISTING ENGINES.

And specially adapted to Pile-Driving, Pumping, Hoist-  
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Cargo Ballast. Also for Steamers, Ships, Lighters,  
Barges, Docks, Warehouses, Elevators, Contractors,  
Railroads, Mines, Quarries, Etc., Etc.

Send for special catalogues.  
We make 180 different sizes and kinds.  
IMPROVED PORTABLE AND STATIONARY EN-  
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MACHINERY.

On application will be pleased to send you catalogue of  
what you may want in the shape of machinery.  
Say where you saw this.

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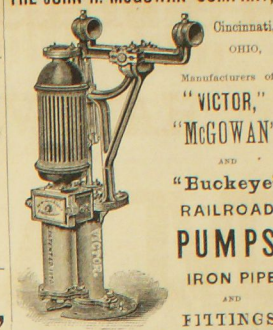
NEW YORK OFFICE: 30 Pine St., JAS. JOHNSTON, AGT.  
CHICAGO OFFICE: 111 Dearborn St., C. V. HICKOK, AGT.

## Hopkins' Patent Lead-Lined, Self-Fitting Journal Bearings.

Meneely's Patent Bell-Metal Ended Journal Bearings, for Reducing Lateral Wear.

MADE BY  
GEO. R. MENEELY & CO., West Troy, N. Y.,  
and Atlanta Brass Foundry (A. B. Hostick, Supt.), Atlanta, Ga.

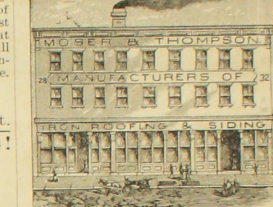
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Cincinnati,  
OHIO,  
Manufacturers of  
"VICTOR"  
"MCGOWAN"  
AND  
"Buckeye"  
RAILROAD  
PUMPS,  
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And BOILER FEEDERS.  
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The best material in use for covering Roofs and  
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GENERAL AGENTS FOR IRON ROOF PAINTS,  
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28 TO 32 RIVER STREET,  
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Send for circulars and price list, naming the Car-  
Builder.



# TO MASTER CAR-BUILDERS.

YOUR ATTENTION IS INVITED TO OUR LARGE AND VARIED STOCK OF

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OUR OWN MANUFACTURE, EMBRACING CHOICE SHADED AND FIGURED

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IN VENEERS, PANEL THICKNESSES, ETC.

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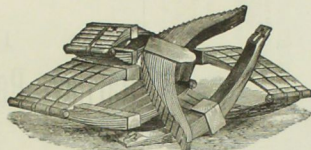
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EXTRA TEMPERED,



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## CAST-STEEL SPRINGS,

WITH PATENT HOT COMPRESSED BANDS FOR RAILROAD CARS AND LOCOMOTIVES.

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CALVIN WELLS, President and Treasurer.

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We make a Specialty of our well-known brand of Railway Axles marked "Special" from new iron, guaranteed to be purely fibrous, and to stand the regulation drop test of the Penna. R. R. Company.

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## BAR IRON & BOLTS,

Channel and Angle Iron, Bridge Bolts, plain and upset ends, all sizes, Track Bolts, Square and Hexagon Head Bolts, Rivets, Washers, Fish Plates, Etc.



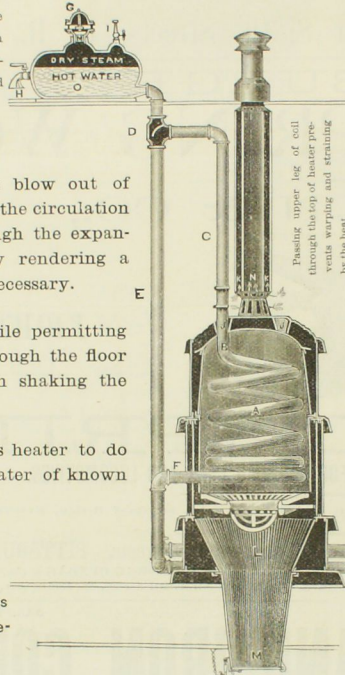
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## Searle Hot Water Heater, FOR HEATING PASSENGER, PARLOR, DRAW- ING ROOM AND SLEEPING CARS.

When the fire is low the pipes may be refilled through the funnel cock, without requiring the pipes to be cooled off.



Salt Brine cannot blow out of this heater, because the circulation does not pass through the expansion drum, thereby rendering a pressure gauge unnecessary.

No dust arises while permitting the ashes to pass through the floor of the car, or when shaking the grate.

We guarantee this heater to do all that any car heater of known repute will do.

For Full Particulars  
Please Send For Descriptive Circular.

## WINDOW AND BLIND FIXTURES, DOOR HINGES AND LOCKS,

Basket Racks, Saloon Fixtures,  
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Engraved Glass, Ventilators and Registers,

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Car Trimmings, Street Car and Omnibus Trimmings.

Brass Journal Bearings a Specialty.

ORME PAT. SAFETY VALVE.

Sole Manufacturers of the Cottier Street Car Gong.

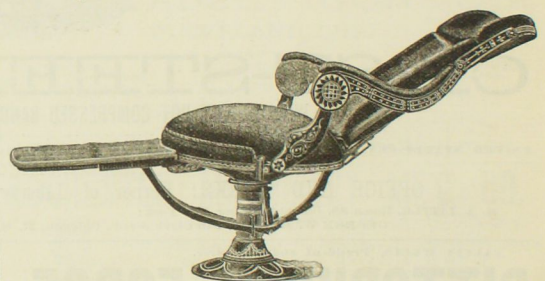
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Special Designs Furnished for the Interior Decorations of Day, Night and Parlor Coaches.  
TRIMMINGS OF EVERY DESCRIPTION.

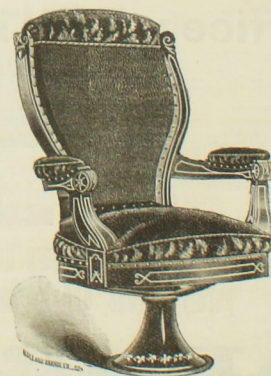
SOLE MAKERS OF

Niles' Patent Car Door Locks,  
MORGAN'S DECK SASH RATCHET,  
Mansfield's Deck Sash Opener,  
TODD'S FREIGHT CAR LOCKS.  
CAR SEATS OF EVERY DESCRIPTION.  
WOOD HEAD LININGS, in Oak, Bird's-eye Maple  
and Birch.

## THE POPULAR Hartley Reclining and Revolving Chair.



HEAD REST DOWN.

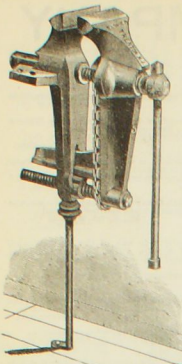


REVOLVING CHAIR FOR PARLOR CARS.









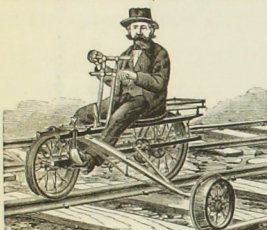
### THE FISHER DOUBLE-SCREW VISE.

Stronger than any other Leg Vise,  
AND ALWAYS PARALLEL.  
The Best Vise for R. R. Machine Shops and Car-  
Builders, and for all heavy work.  
Accurate and Durable.

MADE ONLY BY  
**THE EAGLE ANVIL WORKS,**  
TRENTON, N. J.

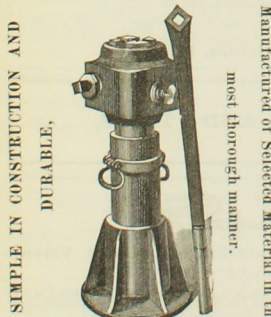
Attention, Book Buyers! Big Pay to Agents!!  
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MAKERS, CAR-BUILDERS, and Mechanics of every  
class, will find in Moore's Universal Assistant  
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The Sheffield Velocipede Hand-Car.



This Hand-Car is especially adapted to the use of  
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and for all work where one or two men wish to go  
over the line at will. Also, our Telegraph Cars,  
capable of carrying two men and material. Light,  
Easily Handled, and when ready for shipment oc-  
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vantage to railroad men. Run easily, being pro-  
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run short distances at the rate of 20 Miles an  
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Lowering valve worked by thumb screw, giving  
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guided top and bottom, insuring perfect working.

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Patent Twist Drills, Machine Bits for Wood, Bit Stock Drills, Reamers, Standard Gauges, Milling Cutters  
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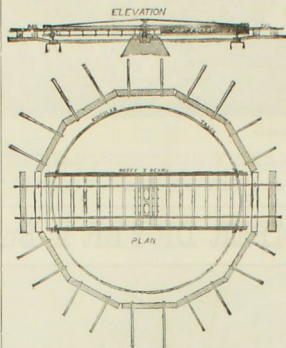
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FINE RAILWAY AND COACH VARNISHES.

Colors, Dry, in Oil and Ground in Japan.

FREIGHT CAR AND BRIDGE PAINTS READY FOR USE



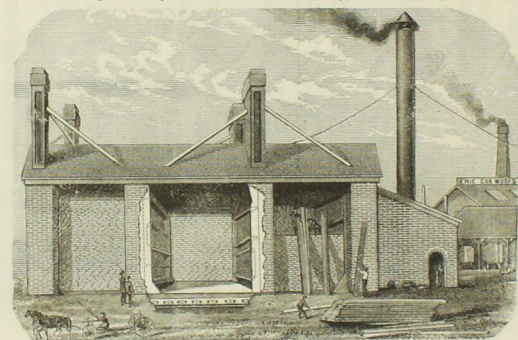
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This cut represents a recently patented wrought  
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Six Chamber Dryers built by us at the Erie Car Works, May, 1880. Capacity 210,000 feet.



Constructed on new and scientific principles. The only perfect Lumber Dryer invented, and is the  
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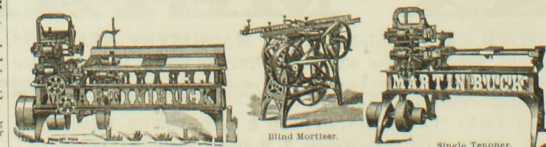
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For Boiler Feeding and Fire Protection a Specialty.  
**THE IMPROVED DAYTON CAM PUMP.**  
Designed and built especially for BOILER FEEDING and for PUMPING HOT WATER.

Steam Pumps and Hydraulic Machinery  
For Railroad Purposes.  
The Combined Pump and Boiler, with Remov-  
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The MOST POWERFUL FIRE PUMPS ever made.  
Every machine warranted. Over 1,800 in use. Send  
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Single, Double and Triple Tendons and Gearing done on the same machine, especially adapted to car work  
Single Tendons at Iron with carriage mounted on trucks, Blind Mortiser and Borer combined for fixed and  
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CORRESPONDENCE AT MARKET ST. PHILADELPHIA PA U.S.A.  
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also, OIL CLOTH, LINOLEUM,  
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**STEEL CASTINGS.**  
RAILROAD AND MACHINE CASTINGS  
OF ALL KINDS FROM 2 LB TO 10 TON.  
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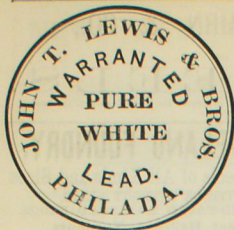
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**Railway Car Findings.**  
PLUSH IMPORTERS.  
**RUBBER GOODS,  
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Manufacturers of white Lead, Red Lead, Zinc Oxide, Orange Mineral, Linseed Oil, and other products.

No. 231 South Front Street.  
Important to Railroad Managers  
and Master Mechanics.

**SIBLEY'S PERFECTION VALVE OIL.**

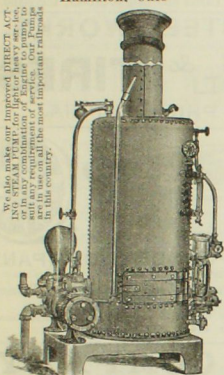
More perfect lubrication insured, and entire freedom guaranteed from corrosion of cylinders and destruction of steam joints by fatty acids.

In exclusive use on 50 railroads.  
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Manufacturers of Special Machinery for  
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WHITE AND YELLOW PINE AND OAK.

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**Frost Proof Tanks**

100 to 100,000

Gallons capacity, with

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Improved Double-Acting Pumps.

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NO LOOSE SECTIONS.

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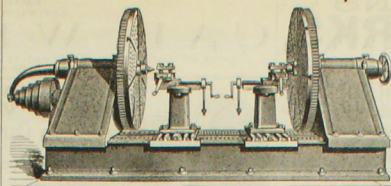
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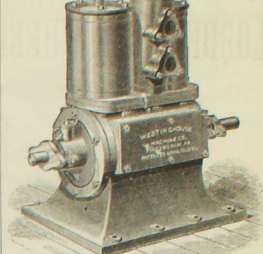
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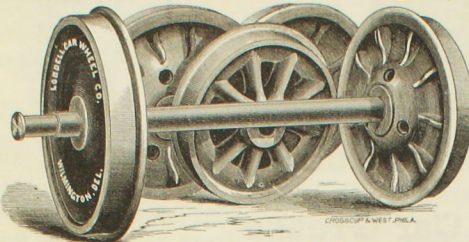
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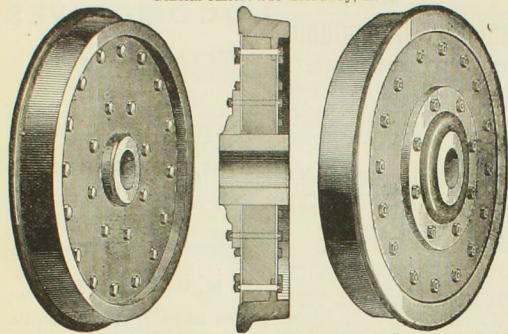


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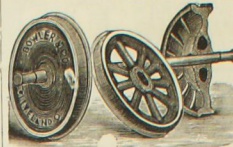
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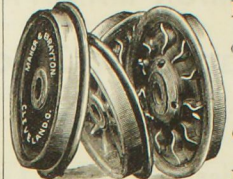


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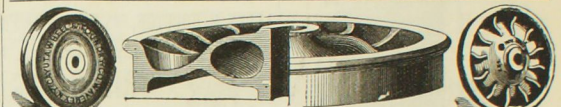
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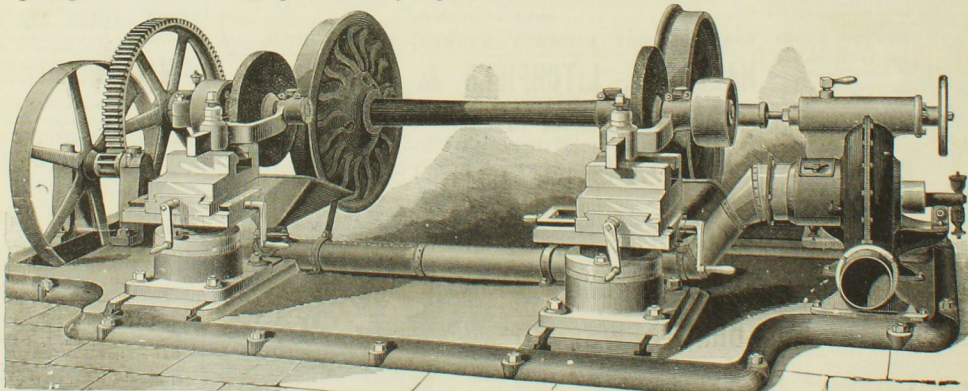
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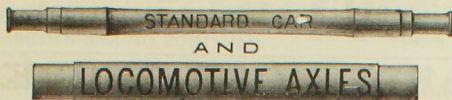
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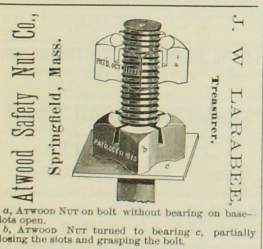
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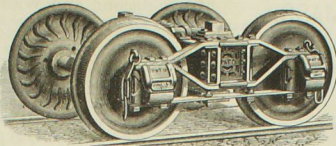
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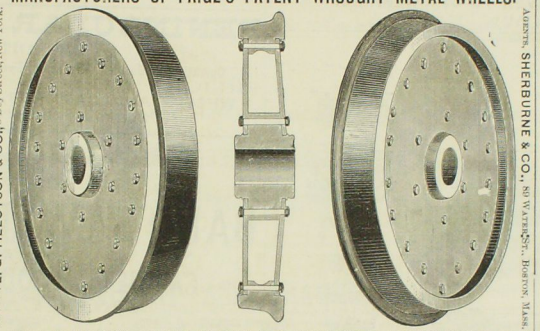


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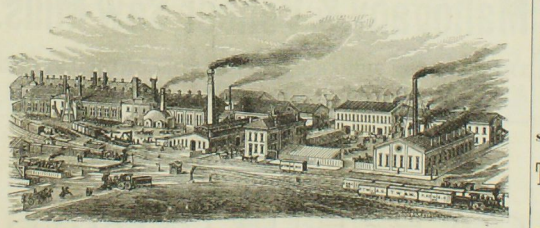
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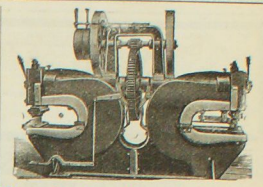
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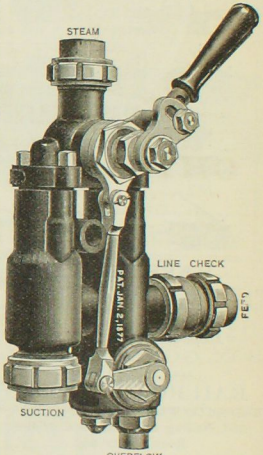
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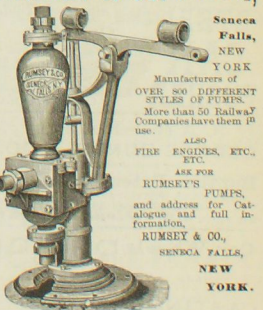
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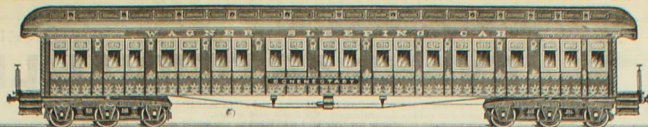
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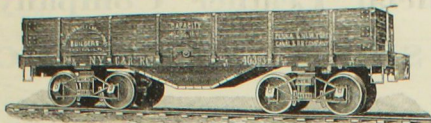
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BROAD AND NARROW-GAUGE FREIGHT & COAL CARS  
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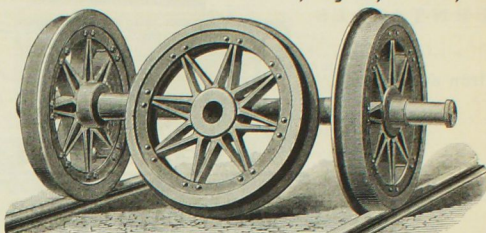
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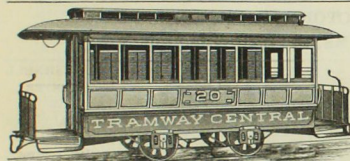
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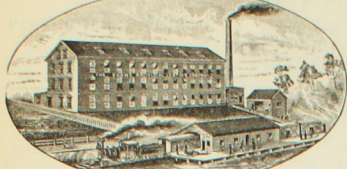
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This is the only substitute for UPPER LEATHER in the world that has PROVED SATISFACTORY OR PRACTICAL, and that cannot be distinguished from leather. Being very handsome and durable, not affected by heat or cold, and impervious to oil or water, it is for many purposes superior to leather, and costs from 33 to 50 per cent. less. It is manufactured in various weights and in every desirable shade of color, including gold, silver and bronze. It comes in rolls of 30 and 50 yards, and 30 and 50 inches in width. A corporation has recently been organized under the laws of New Hampshire—where the factory is located—for the manufacture of this Artificial Leather, under various letters patent granted by the United States. A full assortment of the above most desirable goods can be found and articles made from it shown, at office and salesrooms, 92 Broad street, corner of High street, Boston, Mass. Send for price list to the

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## MANUFACTURERS OF WOOD-WORKING MACHINERY.

The Latest Improved  
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Railroad Car Shops.

OUTSIDE MOLDER.

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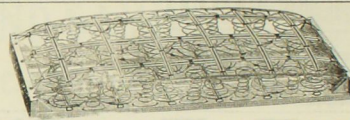
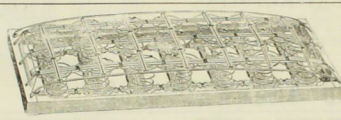
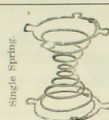
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Planers, Vertical  
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WAREHOUSES, 109 Liberty St., New York.

BUSHNELL'S PATENT  
SPRINGS for Car Seats,  
Backs, Berths and Mat-  
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world. Adopted and  
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Spring in a Car Seat Frame.

Double Spring Edged Seat, and New Style of Frame, no side Rails. Patented June, 1882.

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DANIELS PLANING MACHINES A SPECIALTY.

MANUFACTORY: WORCESTER, MASS.

UNITED STATES OF AMERICA.

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For Generating Steam, and for Steam and Water Circulation.

Forming two independent currents, hot water for moderate weather, reinforced by steam for severe cold. Heating capacity estimated at 125 per cent. over any other apparatus in use, with one-third less fuel. Noiseless and Non-explosive in operation, constructed without Valves or Checks, and requiring no mechanical arrangement for safety—a device with open pipes. Steam circulation without pressure, affording heat free from smoke, gases, or the objectionable odor arising from over heated steam. The invention consists in the construction and arrangement of mechanical devices and philosophical combinations through which the results are obtained. The accompanying drawing will place the system in an intelligible form. The substantial construction and guarded assurance safety from fire or explosion to a far greater degree than by any device heretofore produced. The success of this system of heating is now fully demonstrated by its application upon a large number of passenger cars on the leading railroads in New England.

The official communications which are herewith presented give indisputable evidence of this fact, and are in themselves sufficiently explicit to require no further comment in evidence of the value of this improvement in point of comfort to the passenger and economy for those who adopt its use.

COMMONWEALTH OF MASSACHUSETTS. BOARD OF RAILROAD COMMISSIONERS, No. 7 FERRIS STREET, BOSTON, JUNE 24, 1882.

CHARLES F. CHASE, Esq., Pres. Old Colony R. R. Co.

Dear Sir:—The Board has received yours of the 23d inst. asking approval of the Safeguards for protection against fire furnished by Johnson Railway Heater. The Commissioners have examined the Johnson Heater, and at a meeting of the Board this day it was voted that the "Johnson Railway Heater" for warming passenger cars, be and is hereby approved.

Respectfully yours, WM. A. CRAFTS, Clerk and Sec. of the Board.

Dear Sir:—We have used the Johnson Heater for our passenger cars the past three years. They have given perfect satisfaction in every respect during the extreme cold weather. They kept our cars warm as we desired them to be. I never have heard a word in regard to the heaters, except in commendation of them. We have eighty-two of them in our cars, and shall add more this fall. I consider the new Heater very much superior to the old. It works perfectly.

Very truly yours, J. R. KENDRICK, Superintendent.

Old Colony Railroad, Office of Passenger Transportation Master, Boston, Jan. 11, 1882.

ROBERT JOHNSON, Esq., Pres. Payson Tucker, Sup't.

Dear Sir:—We have used the Johnson Heater in our passenger cars for the past two years. They have given perfect satisfaction in every respect. During the extreme cold weather of last winter they did all that you claim for them, and our cars during that time were as warm as we desired to have them.

Very truly yours, J. R. KENDRICK, Superintendent.

Old Colony Railroad, Office of Passenger Transportation Master, Boston, Jan. 11, 1882.

ROBERT JOHNSON, Esq., Treasurer Johnson Heater Co.

Dear Sir:—It gives me pleasure in testifying to the excellence of the "Johnson Heater," which is in use on this road for the third winter. It is absolutely non-explosive, a great saver of fuel, and more easily managed than an ordinary coal stove. The thermometer has shown 100° within 40 minutes after the fire was started. The temperature of the cars is uniform and gives good satisfaction to the patrons of the road. We have at the present time twenty-six of them, and shall soon add more.

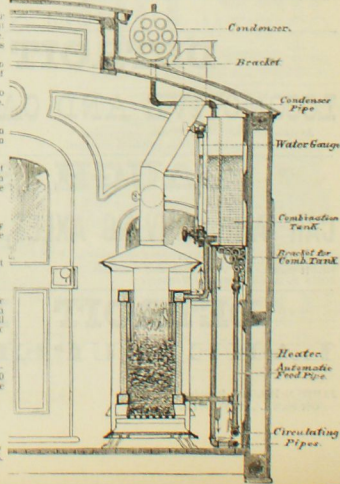
Very sincerely yours, J. C. SANBORN, Passenger Transportation Master.

Eastern Railroad Company, Office of Master of Transportation, Boston, Mass., Trans.

**THE JOHNSON RAILWAY HEATER COMPANY,**

Office, No. 8 Exchange Place, Boston, Mass.  
JOHN WOOLLEDGE, President.  
The Heater can be seen at the Old Colony, Boston & Providence, Fitchburg, Boston & Maine, and Eastern railroads, in Boston; also, at the Maine Central Railroad, in Portland, Maine; and at SMITH & ANTHONY'S, Nos. 52 & 54 Union Street, Boston; Boston & Albany, New York; Lake Erie & Western, Michigan Central, Central Vt., Providence and Worcester, and at Pullman Palace Car Works, Pullman, Ill.

Workshops, No. 50 Union Park Street, Boston, Mass.



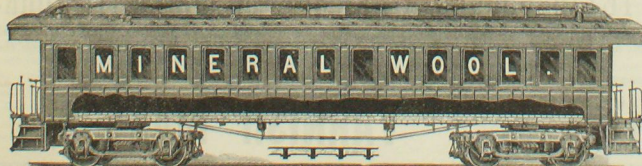


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H. xxii Long & Alastetter Co., Hamilton, O. xxii	<b>Power Moulding Machines:</b> Aikins & Drummond, Louisville, Ky. xxii	<b>Power Punches, Shears and Hammers:</b> Hilles & Jones, Wilmington, Del. xxii The Long & Alastetter Co., Hamilton, O. xxii	<b>Publishers:</b> Builder and Wood Worker, New York, N. Y. xxiv	<b>Pumps:</b> Cope & Maxwell Mfg. Co., Hamilton, O. xiv Delamater Iron Works, New York. xiv Rumsey & Co. (Limited), Seneca Falls, N. Y. iv Smith, Vale & Co., Dayton, O. iv Valley Machine Co., Eastonham, Mass. xxv Worthington, H. R., 239 B'way, N. Y. (cover) 2	<b>Railroad Supplies:</b> Ewing, Mitchell & Co., Pittsburgh, Pa. iii Iron City Scrap Metal Co., Pittsburgh, Pa. xxv Leah, H. L., Boston, Mass. xxvi Post & Co., Cincinnati, O. iv Rosa, Jas. W., 36 Dearborn st., Chicago, Ill. xv Stern & Lawson, Cincinnati, O. xv Sullivan, J. E. & Co., Pittsburgh, Pa. iv Union Brass Co., Chicago, Ill. iv	<b>Rails:</b> Springfield Iron Co., Springfield, Ill., and New York. (cover) 2	<b>Railway Car and Locomotive Forgings:</b> Pittsburgh Forge & Iron Co. i Wilson, Walker & Co., Pittsburgh, Pa. (limited) xvii	<b>Railway Equipment:</b> Innes, Thos. B. & Co., New York, N. Y. (cover) 1 The Railway Equipment Co., Boston, Mass. xxii	<b>Ratchet Drills:</b> E. G. Fellows, Buffalo, N. Y. (cover) 2	<b>Rochester Machinery Manufacturing Co:</b> Wormer, G. S. & Sons, Chicago, Ill. (cover) 2	<b>Roofing:</b> Roser & Thompson, Cleveland, O. (cover) 2 Porter Iron Roofing Co., Cincinnati, O. xxv	<b>Safety-Nut:</b> Alford Safety-Nut Co., Springfield, Mass. vii	<b>Safety Valves:</b> Ashley Valve Co., Boston, Mass. xiv	<b>Sand Paper and Emery Cloth:</b> Baeder, Adamson & Co., New York, N. Y. (cover) 4	<b>Sash Balances:</b> Anderson's. xiii	<b>Sash Holder and Lock:</b> Ormsby Sash Holder Co., Boston, Mass. xxvi	<b>Saw Setting Machines:</b> Amesbury, O. W. & Co., Philadelphia, Pa. vii	<b>Saw Sharpeners:</b> Railway, Lehigh & Co., Chicago, Ill. vii	<b>Scrap Iron Dealers:</b> Iron City Scrap Metal Co., Pittsburgh, Pa. xxiv	<b>Shanties:</b> Sellers, Wm. & Co., Philadelphia, Pa. (cover) v	<b>Sheet-Iron:</b> Thompson, A. A. & Co., Water street, N. Y. xv Wood, W. D. & Co., Pittsburgh, Pa. xv	<b>Silgo Stay-Bolt Iron:</b> Phillips, Nimick & Co., New York, N. Y. (cover) xv	<b>Soap (Liquid):</b> Whitney, G. F., Boston, Mass. xxiv	<b>Stand Pipes for Water Stations:</b> Van Vore & Pratt, West Albany, N. Y. xxvi	<b>Steam Gages and Valves:</b> Crosby Steam Gage & Valve Co., Boston, Mass. xxii	<b>Steel:</b> Chrome Steel Works, Brooklyn, N. Y. (cover) 1 Crucible Steel Co., Cleveland, O. xxiv Detroit Steel Works, Detroit, Mich. (cover) 3 Mittvale Steel Co., Philadelphia, Pa. xiv	<b>Steel Castings:</b> Lester Steel Castings Co., Philadelphia. xxiv Eureka Cast-Steel Co., Philadelphia, Pa. iv	<b>Steel Tiles:</b> Mittvale Steel Co., Philadelphia, Pa. vii Standard Steel Works, Philadelphia, Pa. vii	<b>Stitch Mands:</b> Union Switch & Signal Co., Pittsburgh, Pa. (cover) 1	<b>Stitches:</b> Union Switch & Signal Co., Pittsburgh, Pa. (cover) 1	<b>Taple Blocks:</b> Penfield Block Co., Lockport, N. Y. xxvii	<b>Tacks and Dies:</b> The Pratt & Whitney Co., Hartford, Conn. xxii	<b>Trips:</b> Gering Mining & Mfg. Co., New York, N. Y. xxv	<b>Tool Drills:</b> Morse Twist Drill and Machine Co., New Bedford, Mass. iv	<b>Varnishes:</b> Babcock, John & Co., Boston, Mass. xii Berry Brothers, Detroit, Mich. xii Bigelow, Moses & Co., Newark, N. J. xii Billings, Margaret & Co., Cleveland, O. xii Brooks, Clarence & Co., New York. xii Burbank, Ryder & Dunton, Boston, Mass. (cover) 1 Devos, F. W. & Co., New York. xii Mansury, John W. & Son, New York. xii Murphy & Co., N. Y. City and Cleveland. xii Shipman & Bolen, Newark, N. J. xii Valentine & Co., New York, N. Y. xii	<b>Veneers, Papered:</b> Spurr, Chas. W., Boston, Mass. xxv	<b>Ventilators:</b> Adams & Westlake Manufacturing Co., Chicago, Ill. xxii Globe Ventilator Co., Troy, N. Y. xxiii	<b>Vise:</b> Eagle Anvil Works, Trenton, N. J. iv	<b>Waste (Cotton Seed Hulls):</b> National Fly Patent Waste Co., New York. xxv	<b>White Lead:</b> Jewett, John & Sons, 181 Front street, N. Y. v Harris, J. T. & Bros., Philadelphia, Pa. v	<b>Wire Netting:</b> E. B. Houghkeppie, Chicago, Ill. xxii	<b>Wood-Working Machinery:</b> Benjamin, Fischer & Mallery, Chicago, Ill. xxvii Beniel, Margaret & Co., Hamilton, O. xxii Buck, Martin, Lebanon, N. H. iv Cordesman & Igan, Co., Cincinnati, O. ix Fay, A. A. & Co., Cincinnati, O. xii Forsyth, S. C. & Co., Manchester, N. H. xxvi Goodell & Waters, Philadelphia, Pa. xx Lane, Beloit & Co., Cincinnati, O. vii Lee, H. A., Worcester, Mass. xxv Richardson, H. A., Worcester, Mass. xxv Rogers, C. B. & Co., Norwich, Conn. x Robinson Machine Co., Fitchburg, Mass. x Smith, H. B. Machine Co., Philadelphia, Pa. iv Wilder, Rugg & Richardson, Worcester, Mass. (cover) 4
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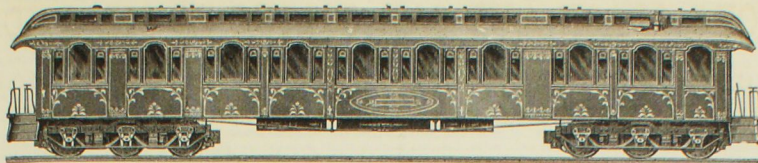
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# THE NATIONAL CAR-BUILDER.



DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XII, 1  
NUMBER 11

NOVEMBER, 1882.

(SINGLE NUMBERS, TEN CENTS,  
\$1.00 PER ANNUM.)

## Miscellaneous Items.

THE Erie shops at Susquehanna are building fifty new locomotives for the use of the road.

MR. ROBERT H. SAYRE has resigned the position of General Superintendent of the Lehigh Valley road.

THE car shops of the Rome, Watertown & Ogdensburg Railroad have been removed from Rome to Oswego.

THE Pullman car shops at Detroit have introduced a new style of ornamentation in car finishing in the form of brass inlay in wood.

THE longest steel spring on record has just been made in Pittsburgh for the States Car Motor Co., of Philadelphia. It is 310 feet long, 6 inches wide, and  $\frac{1}{4}$  of an inch thick.

THE Nickel Plate road has been sold to a syndicate of Western railroad men. Who the actual purchasers are is a matter of conjecture, about which there is a good deal of shrewd guessing.

THE Philadelphia & Reading road is using 600 tons of coal dirt per day as fuel, and the last of a lot of 30 engines designed for burning this kind of fuel are nearly completed for the road by the Baldwin Locomotive Works.

THE Cook Locomotive and Machine Co., Paterson, N. J., are building some locomotives for the Central Pacific Railroad that are said to be the largest in the world. They have 20 x 30 cylinders, 8 driving wheels, and weigh 63 tons.

THE Wabash, St. Louis & Pacific Railroad will build, next year, extensive machine and boiler shops at Andrews, Ind., and abandon their works at Fort Wayne. The principal locomotive shops and division headquarters will be at Andrews.

J. A. FAY & Co., of Cincinnati, builders of wood-working machinery, have furnished the Pullman Car Company's works, at St. Louis, and also the Missouri Pacific car shops in that city, with machinery for the wood-working departments.

THE St. Paul, Minneapolis & Manitoba Railway is to be equipped with new passenger engines, sleeping cars and day coaches, to enable it to run uniform trains for its through passenger business. The new equipment will be first class in every respect.

THE Canton (O.) Car Co. have contracted to build 50 cars for the Washington & Western Railroad, and 500 cars for the Wisconsin, Iowa & Nebraska. The last named road is a new one that is being built and equipped by the Iowa Improvement Co.

THE Gilbert Car Works, Buffalo, N. Y., have orders in hand for 300 hopper-bottom coal cars and 2 mail cars for the Buffalo, New York & Philadelphia road; 200 box cars for the New York, Lake Erie & Western; 300 flat cars for the Maine Central; and 420 Thielsen trucks for the Mexican Central.

A STOCK company has been organized in Brooklyn for the purpose of making a very novel experiment in the building and operation of a new steam railroad. The road, upon which a large force of workmen are now engaged, is building at East New York, and will be called the Bicycle Double-Track Single-Rail Elevated Railway.

THE New York, Susquehanna & Western road has opened its new extension to the Delaware Water Gap. This will prove an important addition to the old line, as it opens an attractive route from New York through the picturesque mountain region of New Jersey. Passenger trains have commenced running to the Gap, and the whole line by next summer will be laid with steel rails.

THE travel on the New York Elevated roads now exceeds 250,000 passengers per day, and it has maintained this average for some time. If the percentage increase in the traffic since the opening of the present month is maintained throughout the year, the next annual report will show that considerably more than a hundred million paying passengers have been carried in the twelve months which it will embrace.—Elevated Railway Journal.

THE C. & C., C. & I. road has received ten new passenger coaches from the Wason Car Works, at Springfield, Mass.

The inside is in plain mahogany without moldings or panels, which gives the car a bare and unfinished appearance. At one end are a closet and lavatory which are separated from the rest of the interior by a partition with a doorless door. The cars seat fifty persons each, ride very smoothly, and are provided with saw, axe and mallet for use in case of accident.

MR. BERKELEY POWELL, one of the ablest mechanical writers of the day, has accepted the position of Master Mechanic of the California Southern Railroad. In addition to this position he will have charge of the Car Department. This road has 140 miles now completed, running between San Diego and San Bernardino. Mr. Powell has been located in Concord, N. H., since 1879, and during that time he has made many friends by his marked professional ability and his many gentlemanly qualities.

THE ALLEN PAPER CAR WHEEL CO. have reduced the price of their 42-inch wheels; the broad tread to \$95, and narrow tread to \$85. The completion of their works at Morris, Ill., together with the improvements made at their Hudson and Pullman works, rendered necessary by the growing demand for the wheel during the past year, has given them facilities, the benefit of which they purpose giving their patrons. This reduction will, no doubt, add largely to the already extensive order list for this popular wheel.

THE GILBERT CAR WORKS are building a lot of the United States Car Co.'s patent screw-lever dump cars for the Burden Iron Co., of Troy, N. Y., and are also filling an order from Australia for the same cars. The Wells & French Co. are building a lot for the Chicago, Wilmington & Virginia Coal Co., and the Gill Car Manufacturing Co., of Columbus, Ohio, are building some for the Cleveland Rolling Mills. The Boston & Maine road has just completed five, and they are so well liked that more have been ordered to be built at once.

THE Denver and South Park Division of the Union Pacific Railroad pierces the main range of the Rocky Mountains, 150 miles southwest of Denver, Colorado. The length of the tunnel is 1,700 feet, and its altitude above the sea 11,500 feet. The approaches on either side are described as marvels of engineering skill, laid through scenes unrivaled for grandeur and magnificence. Although the tunnel commences with a sharp curve at its eastern end, so nicely was the engineering done, that when workmen from either side met in the heart of the great snowy range, they found only about one inch variation in the respective bores.

A CAR lighted by seven incandescent lamps of the Edison make, and fed by thirty Faure accumulators, is now running on the New York Division of the Pennsylvania Railroad between Jersey City and Newark, with results that are said to be very satisfactory. The lights are sufficient to enable the occupants of the car to read newspapers with ease, and do not flicker even when the car is moving at full speed. Seven Edison 8-candle lights are used. The time needed for charging the batteries, with a small dynamo machine, is 44 hours, and when charged they will run the lamps 16 hours. The car was fitted with the lighting apparatus by the Light and Force Company, of New York.

A TRIAL of the Chisholm suspension car trucks was recently made between Pullman and South Chicago. The trucks were under a St. Louis & San Francisco day coach, and had 42-inch paper wheels. The coach was run at high speed over sharp curves and switches. There was no grinding of wheels on rails, and it was impossible to tell, without close observation, when the car entered or left a curve. The sharpest curves were taken at high speed, without any perceptible jar or shock. After this trial, another was made of a set of standard passenger trucks, also built by the Suspension Car-Truck Co. The latter are 33-inch wheels, 7 foot base. The parties who witnessed these trials were highly pleased with the action of the trucks.

THE Rogers car lamp, for lighting car platforms, was tried recently on a car at the Pan Handleships, at Columbus, Ohio. The lamp is placed at the end of the car near

the roof, the light passing through a lens to a fluted or plain glass mirror above the door outside, from which it is reflected upon the platform. Plain glass gives the brightest light but fluted glass distributes it best. A lamp for fluted glass should be about four feet from the door. In cars lighted with two lamps near the door, the magnifying glass may be dispensed with, the two lamps throwing as much light on the reflector as the light of one magnified. With two burners, four feet from the door, and magnifying glasses, the light on the platform and steps is about equal to ordinary light on the interior floor of a car.

THE Vanderbilt 'twin cars,' as they are called, consist of a dining and parlor car, 60 and 70 feet long respectively. The principal feature of the car is a large dining-room extending the whole width of the car, and elegantly fitted up. At one end are the kitchen and sleeping accommodations for the servants, wash-rooms, and other apartments, and at the other a porter's room. The platform between the dining and parlor cars is covered and inclosed, thus practically making one continuous car 130 feet long. The forward part of the parlor-car is taken up by two state-rooms of good size and comfortable as a room at the Grand Pacific. The remainder of the car is one apartment, which may be divided by folding doors, situated about one-third of the distance from the rear of the car. The windows are large, and French plate glass is used exclusively. The car was built with a sort of piazza or covered platform in the rear, but this has been recently inclosed and made a part of the car. No detailed description of the furniture and general fixtures of the cars is necessary, except to say that they are elegant and comfortable, and that every inch of space is made available. Even when running at a speed of sixty miles an hour hardly any motion is felt, so perfect is the running gear. While on a trip the party do not travel at night, and unless in cities where the hotels are particularly good, remain in the cars, where their accommodations are as good as can be desired.—Chicago Tribune.

THE AMERICAN RADIAL-TRUCK CO. (W. J. Richardson, General Manager, Brooklyn, N. Y.) has built a set of these trucks for trial on a passenger coach of the Boston & Albany Railroad. This truck has been before the railroad public for several years, so far as it could be exhibited in the form of a well-constructed model. The inventor, Mr. Walter Youmans, has several times called the attention of the car-builders to it at the monthly meetings held at the Association rooms in New York. But for various reasons, or perhaps for no reason, except that it was a marked innovation upon ordinary construction, its merits were not appreciated. It is now, however, to have a fair trial on one of our leading passenger lines, and under the supervision of a car-builder of long experience who has given special attention to passenger car construction, and who is, withal, thoroughly conservative in the matter of new devices. We refer to Mr. F. D. Adams, the General Master Car-Builder of the above named road. For the purpose of a trial before being shipped to Boston, the trucks were adjusted to a car body on the Brooklyn, Bath & Coney Island road, and although the fittings were imperfect and temporary, the movement of the trucks was highly satisfactory. Their chief peculiarity is the absence of rigidly parallel axles, and the substitution in their place of axles that always maintain a radial position, even upon street-corner curves, and this with a wheel base of 8 ft. The details of the construction by which this desideratum is reached can not be intelligibly set forth in a description. The truck is in all its parts either iron or steel, and as compared with the ordinary passenger truck with parallel axles, the inventor claims that it is lighter in weight and less complicated, as well as cheaper in first cost and repairs, and safer from the fact that the strength of the axle is greatly increased. The performance of these trucks on the Boston & Albany road will be looked for with interest.

We shall publish in our next issue the remainder of the proceedings of the Car-Builders' Convention. It consists mainly of discussions about wheels and wheel gauges.

We will remit 15 cents a copy to parties sending us May or September numbers (1882) of the CAR-BUILDER.







The cars we get from car trusts are built from our own drawings and specifications. Our officers have the control of them. I presume that is the case with all the car trusts, and they are practically the property of the railroad company leasing them in that way. Mr. Forney's amendment would put it in such a way that the actual owners, who are the car trusts, not those who control the cars, would be the parties to appoint the representative member here in this Association.

Mr. RAYMOND: How long would the appointment of the representative members last? It seems to me it would be a far better way to add to Mr. Marden's amendment the words operated or controlled at the date of the annual meeting, or in the month in which the annual meeting is held.

The objection Mr. Wilder makes is a very curious one, I think. It is a question that needs to be carefully considered before you will admit anybody in here who owns a car. But if this appointment is made for each year, then say it is for each thousand cars the company he represents owns, operates or controls on the first day of the month in which the annual meeting is held. Then you will certainly have a fair representation of all the cars. The United States Rolling Stock Company is entitled to an active member here now because they are manufacturers. It would not be so with the Standard Oil Company.

Mr. HILDRETH: I would call the gentleman's attention to the latter part of section 3: "Their membership shall cease in case their appointment is revoked by any officer authorized to make it," so it is entirely in the hands of the railroad company.

The President: I, for one, certainly shall object to any companies having representative members in this association unless appointed by a railroad company, and I should decidedly advocate that all the cars that the company may own, lease, or control at the time of the meeting should be represented here. If we admit all the private car companies and owners, we will get into hot water very soon. In fact, we are already there, and I do not think we ought to do anything to complicate our present difficulties.

Mr. MARDEN's amendment was carried by a vote of 40 to 10.

Mr. RAYMOND: I move to insert "operated and controlled at the date of their appointment." So far as cars are operated and controlled, they should, in my opinion, be put on the same basis as cars owned by the company.

This motion was, after some discussion, referred to a committee, consisting of Messrs. Fry, Goodwin, and Forney. The several articles and sections, until Article IX, was reached, were agreed to, with some verbal and unimportant amendments. That portion of Section 1 of Article IX, which requires that all recommendations of standards, before they are finally adopted, shall be approved by letter ballot, gave rise to some discussion.

Mr. GOODWIN: I understand the meaning of this to be that, notwithstanding we have already voted, we are still to be provided with the letter ballot, which we are to endorse, and which is to be signed and returned. Would it not be a good idea, in view of what has been stated here, to provide that the letter ballot should be signed not only by the member of the association, but by an officer of the company which he represents, stating that the company will adopt the thing recommended, whatever it may be? Let it be done in the name of the company.

Mr. MARDEN: That meets my idea upon the subject. The convention, in the first place, has voted upon these recommendations, and it is afterwards submitted to them again by letter ballot. Now, if we could obtain the signature of one of the officials of the road authorized to act for them, so that it might become understood that they would adopt whatever measure we recommended, I should be earnestly in favor of it.

Mr. FORNEY: While I quite approve of the motive Mr. Goodwin has in making this suggestion, at the same time I have been brought into contact so much with the feelings of suspicion and apprehension which the superior officers entertain, that they would not in some way and themselves to do something which they did not know anything about, that I should be a little afraid of putting in a clause such as Mr. Goodwin suggests. I feel, if we conduct the business of this association in the way that he suggests, we introduce something of that kind; but I am a little suspicious that railroad companies would be apprehensive of it now.

Mr. WILDER: We are to understand, then, that the first action taken here by the convention does not have any binding effect, even as a recommendation, except as a recommendation to other members who may not have been present.

Mr. FORNEY: The idea is that the subject would be thoroughly and fully discussed at these meetings. Then a vote would be taken to get at the sense of the meeting, which would be in a measure a guide to the members who were not present. In order to give everybody an opportunity of reflecting on the matter, there will be a final vote taken by ballot, over which every member could deliberate to any extent he might desire within three months, the purpose being to guard against hasty action.

Mr. RAYMOND: I would like to ask if it would not be one of the results of discussing standards these meetings and then sending a report of the discussion to the members, to diminish the attendance about two-thirds? If a member can stay at home and vote as well as if he were here, would not that be a great inducement to him to stay at home?

After some further discussion, the section was referred to the committee above named.

The question then being on the adoption of Section 2, Article IX, which reads as follows:

No resolution, vote, or other action of the association shall be adopted or taken recommending railroad companies to use any material, machine, process of manufacture or invention which they have no lawful right to use.

Mr. RAYMOND: I am going to propose a substitute for this section, and then move that the section and the substitute so proposed be referred to the special committee. The meaning of the section as it now stands is, that we shall never recommend the use of any material or machine, or anything that is the subject of a valid patent; or in other words, that we shall keep seventeen years behind the age. Now there is a way of overcoming this difficulty and of doing justice to all parties concerned, and of putting this from the minds of the members by changing the language of the section. The suggestions in the report of the committee

charged with drawing up this constitution are all well-timed and pointed, but there is a danger not suggested which I want to suggest, and that is the matter of damages for accidents that may occur. They will occur and we cannot help it. The question arises in those suits for damages, whether the railroad company has used due diligence. That question is determined by the fact whether the railroad company has in use the best thing known for the purpose of preventing that special accident. I do not believe in shirking responsibility, and in this matter the Master Car-Builders' and the Master Mechanics' associations should take, the full measure of it, so that their discussions and determinations shall be intelligent and shall lead to this conclusion—that what they recommend is the best thing known for its purpose, and no recommendations for standards shall be made except upon that platform. As to the relations between this association and the one I represent, and the Eastern Railroad Association, that is a matter that may be determined by the Executive Committee. It was my first suggestion, in reply to the letter I received from the committee on the amendment of the constitution, that certain plans should be adopted; but I think the whole matter may be left with the Executive Committee of this association to deal with as the plans may require in connection with the Executive Committee of the Eastern and Western Railroad Associations; and there is plenty of latitude in the constitution for that purpose. The substitute which I wish to propose for this section, but which I do not want to have adopted hastily now, is that "All reports, resolutions and recommendations involving the use or the proposed use by railroad companies of any device or process, which forms the subject matter of any existing patent, shall first be submitted to the Executive Committee, and shall be submitted to the association only by the Executive Committee." There is but one way of protecting the interests of the railroad companies in advance, so as to have a device, which is the subject matter of a patent, and that is by making an agreement with the patentee that any person, firm or corporation owning, leasing or operating any railroad company, may have a license under that patent, and under any improvements in it which he may thereafter own or control, upon a certain reasonable royalty. Now, if a certain device or process is the best thing known in the country for the purpose, the railroad companies will use it, and they will not be buying and selling—how much does the patentee want? The patentee may take the device or process and keep it for years. All the railroad companies can do is to say to him, "We have got along for twenty-five years without this thing and we can do so for twenty-five years more unless you are reasonable." An endorsement and recommendation is such a desirable thing to the patentees and owners of these improvements, that you will have no difficulty whatever in making with them reasonable terms for their use. I see through this means for removing barriers which ought not to exist to the use of these improvements. The patentees complain very reasonably that the difficulties in the way of introducing—

Mr. FORNEY: Will Mr. Raymond allow me to interrupt him for a moment? I think that he started out with the assumption that this would prohibit the use of patents or the recommendation of patents by this association. I do not think Mr. Raymond will deny the fact that no railroad company has any lawful right to use a patented invention without the consent of the patentee.

Mr. RAYMOND: The fact is, that the railroad companies will not use any man's property, whether a patent or other property, without in advance securing the right to do so. I do not understand the section quite as Mr. Forney now puts it; but the action must be interpreted in that way as I see it.

From this point the discussion was continued at great length, disclosing much difference of opinion and a good deal of misapprehension in regard to the points involved. Mr. Raymond expressed his views in regard to the necessity of agreeing upon some course that should be followed, fair and satisfactory both to patentees and to the railroads. He proposed, substantially, that when a committee of research of the Car-Builders' Association should conclude that any particular patented device was the best of its class for the purposes of railroads, the committee should report to the Executive Committee, and then the latter committee should ask for information as to the relations of the patent from the Eastern or Western Railroad Association, and then either of these associations shall have investigated the matter, and made an arrangement with the owners of the patent for the right to use the device, it would then be perfectly proper for the Car-Builders' Association to recommend it to the railroad companies. No one connected with the Car-Builders' Association, nor any general solicitor of any railroad, was competent to make such investigation or arrangement. It could only be done authoritatively by the associations who were organized for that purpose; and in order to insure the best results, it was at present unwise to determine definitely what should be the relations between the Car-Builders' Association and the Eastern or Western Railroad Association; and furthermore, the whole thing should be left rather loosely and with a great deal of latitude in the hands of the Car-Builders' Executive Committee.

After a great deal of discussion, the substitute offered by Mr. Raymond for Sec. 2, Art. IX, was unanimously adopted. (See constitution as revised, on another page.) The instrument, together with the by-laws was then adopted as a whole.

#### OFFICERS AND EXECUTIVE COMMITTEE.

The following officers were then elected to serve for the unexpired term to June next:

President, Leander Garey; Vice-Presidents, M. P. Ford, Wm. McWood and John W. Cloud; Treasurer, B. K. Verily.

The following Executive Members were also chosen:

W. Forsyth, of the Chicago, Burlington & Quincy; W. T. Hildreth, of the Harrisburg Car Co.; and J. W. Marden, of the Fitchburg Railroad.

After the election the President appointed W. J. Christopher, of the New Jersey Central; L. Packard, of the Baltimore & Ohio; and John S. Lentz, of the Pennsylvania & New York, as Executive Members to serve until next June.

The Executive Committee consists of the President, Vice-Presidents, Treasurer, and the six Executive Members above named.

The following special committees were added to those appointed at the June meeting:

Sharp Flanges.—What is the cause of sharp flanges, and

how can they be prevented? H. Stanley Goodwin, Lehigh Valley Railroad, Chairman.

On a Standard for Coupling Links and Pins.—The committee to recommend a standard form and proportions for coupling links and pins: Howard Fry, New York, West Shore & Buffalo; Sanford Keeler, Flint & Pere Marquette; Richard H. Sohle, Pittsburgh, Cincinnati & St. Louis.

After the adjournment the Executive Committee held a meeting, and appointed Mr. N. M. Forney Secretary to the Association.

The next annual meeting will be held in Chicago.

#### REPORTS.

COMPARATIVE MERITS OF IRON AND STEEL WHEELS.

The Committee on this subject submitted the following report:

To the Master Car-Builders' Association:

Your committee appointed to report upon the safety and cost of service of cast-iron chilled wheels as compared with steel tired wheels, Allen paper wheels, and English wrought-iron center and other steel tired wheels, find that it is not possible at the present time to report positively and definitely as to comparative cost of service. We are fully satisfied, however, that either of the steel tired wheels now in use are to be preferred to cast-iron chilled wheels for passenger service, and for the following reasons:

In the matter of safety, which is the first consideration, we think there can be but one opinion as respects the superiority of the motion of a car, in having a wheel that is perfectly round in preference to one that is not round. As to the English wrought-iron center steel tired wheels, they have been used only to a limited extent in the States, but the Canadian road and particularly the Grand Trunk, have used them extensively since 1876, and no accidents have been traceable to their use to our knowledge. These roads have continued to increase their wheel stock with these wheels, which conclusively shows that the road managers have confidence in them.

The Boston & Albany road put 40 of these wheels in use in August, 1881, 40 more in October following, 16 in January, 1882, 16 in March and 16 in May, making 128 wheels in all. These have been in constant service, and have run, on dates, running 150 to 300 miles a day, and showing no defects or perceptible wear. The road has also a number of these wheels in engine and tender service. It has also 120 (35-inch) and 254 (42-inch) Allen paper wheels in use.

In making comparisons in respect to the value of different kinds of wheels, it seems to your committee that the most important matter to be considered is safety, and in this respect we think the Allen paper wheel combines the essential elements to a greater extent than perhaps any other wheel. Its construction is such that the paper in the body of the wheel acts as a non-conductor by intercepting the blow upon the rail and preventing it from reaching the axle, thereby preventing crystallization to a great extent, and liability of the center of the wheel to break.

With respect to the English wrought-iron center wheel, so far as we can ascertain from the limited experience we have had with it, it is a safe wheel, as much so perhaps as any in use, so far as liability to break is concerned; but it does not, like the paper wheel, prevent the concussion from reaching the axle and cause a tendency to crystallize.

There are also other steel-tired wheels that commend themselves to the attention of railroad officers, among which may be mentioned the Paige wheel, with a wrought-iron plate center, also the Cooper wheel, which has a piece of vulcanized rubber under the tire, with cast-iron center; and the old Washburn wheel, the first steel wheel used to any extent in this country. This wheel has been largely used by the Boston & Albany road since 1870. The passenger cars of the road are mostly equipped with these wheels, and they are also used on engines and tenders, since their first introduction, in the year named, there has never been an accident caused by any defect or failure of these wheels. Your committee, in view of all the facts that could be obtained, have come to the conclusion that for passenger service a steel-wheel of some kind should be used. First, because statistics clearly show that they are safer than cast-iron wheels. Second, they are round, which of course causes the car to run more smoothly and with an easier motion; and, thirdly, we believe the figures submitted with this report show conclusively that they are the cheapest.

F. D. ADAMS,  
J. W. MARDEN,  
Committee.

Appended to the report is the following statement of mileage of Washburn steel-tired wheels on the Boston & Albany road, up to Sept. 1, 1882:

2 wheels have run between 500,000 and 600,000 miles.  
99 " " " " 200,000 " " 400,000 "  
301 " " " " 200,000 " " 300,000 "  
612 " " " " 100,000 " " 200,000 "  
503 " " " " 100 " 100,000 "

1,570 wheels still running.

Of this number, 114 wheels have run between 150,000 and 200,000 miles before first turning; 20 wheels, now running, have made between 150,000 and 200,000 miles, and have never been turned; 50 wheels have run between 200,000 and 300,000 miles before first turning; 3 wheels, now running, have made between 200,000 and 300,000 miles, and have never been turned; 8 wheels, now running, have made over 300,000 miles, and have never been turned.

Of the Allen paper wheels, now running on the Boston & Albany road, 120 35-inch have run from 299 to 114,492 miles. The fact is also referred to that the Allen paper 42-inch wheels have run 280,710 miles, without turning, on the Atchison, Topeka & Santa Fe road, and are likely to make 300,000 miles before they will need turning. A statement is also appended to the effect that on the Michigan Central road 25 42-inch Allen paper wheels made an average mileage of 117,764 before being turned off to uniform size.

There are also some statistics of service of English steel-tired wheels, which are not at liberty to publish.

The following statement is also given, showing comparative economy of iron and steel wheels on the Boston & Albany road: "The actual average mileage of the steel tired wheels has been 280,021 miles. Now, we will assume the average mileage of the cast-iron wheels to be 50,000 miles. To make 280,021 miles the life of a steel wheel it will require 44 cast-iron wheels, and the time in service to make 50,000 miles would be 571 days.

	One pair steel wheels.	44-10 pairs iron wheels.
Value.	\$100.00	\$125.20
Cost of fitting, etc.	4.50	8.80
Interest.	20.16	28.87
Total.	\$124.66	\$158.87
Value of old wheels.	18.75	58.92
	\$105.91	\$99.95

The actual average, however, of cast-iron wheels on Boston & Albany road has been 34,290 miles, the comparative results being as follows:

	One pair steel wheels.	6,416 pairs iron wheels.
Value.	\$100.00	\$179.00
Cost of fitting, etc.	4.50	12.83
Interest.	20.16	28.03
Total.	\$124.66	\$220.86
Value of old wheels.	18.75	58.91
	\$105.91	\$161.95

#### CONTINUOUS BRAKES FOR FREIGHT TRAINS.

The Committee on this subject made the following report:

To the Master Car-Builders' Association:

The committee appointed to report upon the question of having been requested to report whether it is impracticable to apply the brakes now in



use on passenger trains, and if so, why, and whether the objections to applying such brakes to freight trains can be overcome by any other known form of brake, would state that the time since the committee were appointed has been too short to obtain much information on the subject, therefore we submit the following report:

There is no doubt that the brakes now used on passenger trains can be used also on short freight trains, provided the brake attachments are made as strong, the cars kept together in constant use, and the same pains taken to keep them in working order that is now required on passenger trains. Some of the objections to applying such brakes to freight trains, therefore, might be formulated as follows:

1. The liability of the brakes getting out of order, by lying idle at stations or on side tracks.
2. The necessity of transferring all cars to the rear, or throwing them out of the train altogether when their brakes fail to work.
3. The time required to release the brakes after each application.
4. The necessity of running short trains.
5. The necessity of having all cars equipped with the same brake on all roads offering cars for interchange.

Some of these objections it is claimed would be overcome by using other styles of brakes, for example: The Waldemar Electro-Magnetic Brake overcomes the third and fourth objections, being applied at the pleasure of the engineer, and is instantly released from any number of cars.

The Stowe Brake is said to overcome all of them except the last, while retaining all the advantages of the passenger brake. An experimental train is now being equipped with this brake to prove its merits; also a simple device has been invented, which, being attached to the hand-brake of the cars in a train, is calculated to apply it to any two of them between which the train separates, thus automatically setting all the independent brakes there are in the rear section, and at the same time giving the engineer notice that his train has parted, so that he can stop the rest of his train, provided he has a good independent brake to help him, without fear of being run into by the rear section.

The introducing of such a brake on freight trains, namely, stopping both sections of a broken train.

Your committee would say in conclusion, that in their opinion the importance of a good reliable automatic freight train brake to railroad companies can hardly be overestimated; but until more thorough trials of such brakes as possess real merit have been made, and the companies and individual members of this association manifest a deeper interest in the matter, any report that the committee can make must of necessity be of little interest.

Therefore, it is earnestly desired that a full and free discussion of the subject be had, all of which is respectfully submitted.

C. E. GARREY,  
C. A. SMITH.

Committee.

#### Car Surface Painting.

The following paper was read at the recent Master Car Painters' Convention by Mr. C. E. Felch, of the Southeastern Railway, of Canada:

Surface painting! What a world of meaning in these simple words. What cares and anxieties to they imply. They are passed by the uninitiated without a thought; but to a man who has spent half a lifetime in a struggle with the elements which go to make up the various compounds used in this department of painting, they are full of significance.

Surface painting may be properly divided into two classes. The first has for its end beauty and elegance; the second, durability. In the first durability is in a large degree sacrificed to effect; in the second, with which we have to deal, extreme durability is required, and with the present system of doing hurried work a method of procedure must be adopted that will give the best results in the shortest possible space of time. The work, however, will of necessity lack the elegant finish required in fine carriage painting. While I do not claim to put forward anything startlingly new or original, I shall endeavor to give in outline a simple and expeditious method of surface painting as applied to railway cars.

Leaving the patent primers to be properly advertised by their respective proprietors, I shall fall back on the good old-fashioned lead-and-oil priming. For sufficient paint to prime an ordinary passenger coach certainly one-half the liquid used should be raw oil, and here I would say that the quality of your oil should be, like Caesar's wife, above suspicion. Less than half a pint of Japan gold size will dry and bind the priming so that putting may be proceeded with in 48 hours. Putty made of one-half keel and one-half dry, with good rubbing varnish and gold size to bind it, will give very little trouble from shrinkage. It is a very good plan to fill large holes half full and allow this to harden before filling quite full. After sand-papering, a second coat of paint should be given, with the addition of enough raw oil to insure its drying with a slight egg-shell gloss.

If very much hurried, this coat may be omitted and a knifing coat applied at once. This coat should be somewhat thicker than for ordinary coating, applied roughly with a brush and allowed a little time to set. Then it should be knifed in with a broad-bladed filling knife, and a piece of sole leather for corners and moldings. Coarse-grained woods like oak or ash are perfectly filled with one coat. After sand-papering thoroughly, the car is ready for color.

It would be difficult to establish any fixed rule for the quantity of liquids to be used, especially in colors composed principally of lead, as hardly any two brands are ground of the same consistency. But no more oil should be used than will dry soon enough to admit of another coat being given in 24 hours.

To apply a coat of liquid color without brush marks, it will be necessary to use a flat badger flowing brush and blender, after laying the color with an ordinary bristle brush. Dark colors, like umbers and lakes, should, of course, be laid with a flat camel's hair.

The car having received the requisite number of coats to make a solid body, is ready for decoration.

After this, a coat of finishing varnish, with the addition of perhaps one-fourth rubbing, is to be applied, and when dry, rubbed sufficiently to remove the gloss; follow with a heavy coat of clear finishing varnish, and the job is complete.

I may state, in conclusion, that cars painted by this method, and run out twelve months ago, are in good condition at the present time.

FIFTEEN CENTS a copy will be paid at the office of the NATIONAL CAR-BUILDER for May or September numbers, 1882.

#### Standard Freight and Passenger Car Trucks.

(See illustrations on opposite page.)

Report of the committee made to the Car-Builders' Association, at Niagara Falls, Oct. 11, 1882.

To the Master Car-Builders' Association:

The committee appointed to report on Standard Freight and Passenger Car Trucks have been somewhat at a loss to know just what is expected of them.

After the adoption of a standard wheel, journal box, journal bearing, axle and journal bearing gear, it seems somewhat problematical whether any further progress in this direction is possible. The different forms of trucks used are as numerous as the mechanics who construct them, many of them being excellent and all of them undoubtedly having some faults, the weakness of material in one part being more than offset by strength of material in another, sometimes being misplaced, the weaker material being placed where the stronger should be. Your committee, rather than submit any special form for adoption, have thought best to present a few tests for your consideration.

The tests presented were made in an ordinary wheel press, using only one truck, placing it under pressure so as to take the strain exactly as it does under a loaded car. Most of them were made as far back as 1875, and the forms were the ones in common use on the Chicago, Burlington & Quincy road at that time. The more recent tests, which are designated as 11, 12, 13 and 14, were made at the Michigan Central Railroad shops last month.

Up to this time the very common mistake of placing the lightest iron in the upper arch-bar forming the frame of truck was in practice, but some discussion arising as to the correctness of this practice, led to the tests presented and which proved the fallacy of this construction.

Experiments relating to Strength of Car Trucks and Proper Distribution of Material.

The drawings herewith show in black the form of truck side before it was put under the press. The sizes of parts are marked upon the drawings, as are the lengths and distances which are needed. The dotted lines show the form of the truck side when taken from the press.

The table A shows the amount that the centre of truck side fell below the original places for each 5 tons of pressure put on. A part of this giving was, of course, due to the coming together

TABLE A. SHOWING STATE OF TRUCK SIDE AT EACH FIVE TONS PRESSURE UP TO POINT OF GIVING OUT.									
Press.	30	35	40	45	50	55	60	65	70
1	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
2	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
3	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
4	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
5	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
6	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
7	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
8	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
9	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
10	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
11	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
12	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
13	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.
14	At 30 tons began to spring at A.	At 35 tons top bar buckled and took form shown, pressure fell off.	At 40 tons top bar buckled as shown, pressure fell off.	At 45 tons top bar buckled as shown, pressure fell off.	At 50 tons top bar buckled as shown, pressure fell off.	At 55 tons top bar buckled as shown, pressure fell off.	At 60 tons top bar buckled as shown, pressure fell off.	At 65 tons top bar buckled as shown, pressure fell off.	At 70 tons top bar buckled as shown, pressure fell off.

of the joints, which were fitted from the hammer and were not an exact fit, and a part from cutting into the wood of the middle strap.

No. 1 is the freight truck now being built by the C. B. & Q. road. The top bar is weakest. It was the part that gave out.

This stood a pressure of 34 tons (75,000 lbs.) though at 30 tons it began to show signs of weakness. The top bar was 3 x 3/4, the second bar 3 x 3/4. The form taken is shown in dotted line, of this and other tests.

No. 2 is formed exactly like No. 1, except that the top bar is 3 x 3/4 and the second bar 3 x 3/4, the places being changed. The top bar buckled in this also, but at a higher pressure—57 tons instead of 34, as in case of No. 1. The compressive strain on top bar of No. 1 per square inch, 18,576 lbs.; tensile; of second bar per square inch, 19,044 lbs. Compressive strain—top bar No. 2 per square inch, 17,357 lbs.; tensile; of second bar per square inch, 24,179 lbs.

No. 3 is the Allen truck, exactly as it has been built by the C. B. & Q. road for some time, and until the top casting was left off and the truck formed like No. 1, taken as a standard. This only stood a test of 23 tons, when top bar buckled with steam compressive on first bar per square inch 9,872 lbs.; tensile; on second bar per square inch, 9,285.

No. 4 is an iron truck riveted together, as shown, built by the C. B. & Q. road, and known as the Challenger Truck. This, like No. 3, has lightest bar at top where it should not be. From the smaller depth of the truss the smaller strength might have been expected. This stood but 20 tons, when it gave out. Compressive strain on top bar per square inch, 9,528 lbs.; tensile strain on lower bar per square inch, 9,234 lbs. A rivet head was thrown off at A just as it gave out.

No. 5. This truck was built for the test with light middle bar, it being but 1/2 x 3/4, while the top bar was 3 x 3/4, like that of No. 3. The truck otherwise was the same. At 30 tons the 3/4" strap broke through the bolt hole at D. This hole was a drilled hole for a 1" bolt, so that the area was 2 x 3/4" = 1 1/2" at the point broken. The second strap in this case as in others cut into the truss timbers. Compressive strain, first bar per square inch, 14,409 lbs.; tensile strain, second bar per square inch, 29,407 lbs.; tensile area broken, 44,111 lbs.

No. 6. Another truck side built for the test with 3/4" middle bar. This stood 35 tons, and top bar buckled as in other cases; compressive strain, top bar per square inch, 16,308 lbs.; tensile strain, second bar per square inch, 24,449 lbs.

No. 7. Built for the purpose. Top bar was 3 x 3/4 and second bar 3 x 3/4. At 40 tons top bar buckled and gave out. It began to show signs of weakness at 35 tons. The edge of pedestal broke off just before top bar gave out. Compressive strain, first bar per square inch, 16,391 lbs.; tensile strain, second bar per square inch, 24,139 lbs.

No. 8. Built for the test with 3/4" middle bar and 1/2" top bar. At 40 tons the second bar broke through bolt hole E. No sign of failure in top bar. Compressive strain of top bar per square inch, 16,391 lbs.; tensile strain of second bar per square inch, 31,207 lbs. As in No. 6, the area broken was 2 x 3/4" = 1 1/2". The hole being for a 1" bolt, square inch broken, 47,051 lbs. In all these cases the size of bottom strap has nothing to do with the strength of the truck. In some cases it has been 1/2" and in others 3/4", which would seem to be just as good as the other.

No. 9. This is the truck in common use, and known as the "Cleveland Truck." It gave way under a pressure of 29 tons, and pulled off a bolt head at A. Compressive strain, top bar per square inch, 10,503 lbs.; tensile strain, second bar per square inch, 10,503 lbs.

No. 10. This is a low truck built for low flats by the C. B. & Q. road. It stood the pressure up to 46 tons, when the middle bar broke across its full area. It had cut into the wood when the pressure was 25 tons. The top bar kept its place. Compressive strain, top bar per square inch, 16,810 lbs.; tensile strain, second bar per square inch, 22,750 lbs.

No. 11. This is the New York Central standard, and would be made much stronger if auxiliary arch-bar was not so constructed as to shear the bolt upon which the principal strain comes. This truck stood a pressure of 45 tons, when this bolt was sheared off, and as a natural consequence the strength of the truck was gone.

No. 12. This truck was put together for the test by Mr. James McHenry, Superintendent of the Michigan Car Co., and is the standard truck of the Grand Trunk Railway. It stood a pressure of 45 tons. It might be said to be similar in construction to No. 10, the difference being that the auxiliary arch-bar extends along under the inverted arch-bar of the upper truss, consequently doing away with the shearing strain on this bolt. This truck could be stronger if the places of this bar and the inverted bar in upper truss were exchanged.

No. 13. This truck is built by the Michigan Central road, for use under low platform cars used in road trains, and for log trains in the pines. It is similar in construction to No. 10, the sizes of iron being heavier and consequently stronger in proportion. It stood a pressure of 60 tons, when the hook on lower arch-bar broke, and the bolts were sheared off. If the construction had been like No. 11, so as to prevent shearing at the ends of arch-bars, it would have stood a greater pressure; the upper arch-bar also should have been 1 1/2" thick to have been proportionately strong with the other material.

No. 14. This was the standard of the Michigan Central road before the adoption of No. 11 by the Vanderbilt lines. It also stood a pressure of 60 tons, but the upper arch-bar was 1 1/2" in thickness instead of 1", as was the case in No. 13, which makes the strength of material nearer right in proportion. To make distribution of the strength of material nearer right, the upper arch-bar should be 1 1/2" thick, and the inverted bar 1" thick. There are many other forms that are presented, but this is as much as your committee could present in the limited time it had for preparation; and indeed, most of the material forming these suggestions had been collected beginning as long ago as 1875. Your committee have thought best to rest this report on these suggestions without submitting any stated forms, and awaiting further action for instructions from the convention.

Wm. McWoon, Chairman.

#### The Tallman Automatic Freight Brake.

The following is an official report of the results of a trial test of this brake made on the Cincinnati, Hamilton & Dayton Railroad, Oct. 18. The train consisted of two coaches, one caboose, four loaded freight cars and five empty stock cars. The brake was on four cars.

Grade.	Speed.	Time.	Distance.	Manner of stop.
Feet per 100.	per hour.	to stop.	to stop.	
25	25	20	610	4 automatic and engine brakes.
30	25	30	850	4 automatic and engine brakes.
35	25	35	1,700	Engine air brakes only.
40	25	40	700	Engine hand brakes on all cars.
45	25	45	1,350	Hand brakes, no engine brake.
50	25	45	900	Engine and 4 hand brakes.

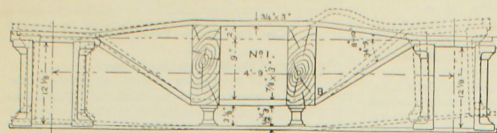
After second test the two coaches were detached from the train. The trial was witnessed by W. W. Peabody, General Superintendent of the Ohio & Mississippi road; J. H. Stewart, Receiver of Marietta & Cleveland; Leroy Kells, Master Mechanic of Pittsburg, Cincinnati & St. Louis; C. C. Waite, Vice-President of Cincinnati, Hamilton & Dayton, and others.

THE Ontario Car Works and London Car Wheel Company have been amalgamated under the name of the Ontario Car and Foundry Company. The directors are: Andrew Robertson, Hugh McKay, Jonathan Hodgson, Montreal; W. K. Miers, Detroit; and Thomas Muir, of London East, managing director.

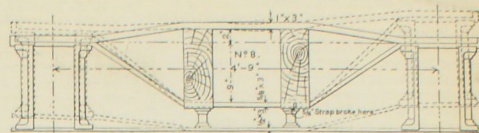


FREIGHT-CAR TRUCK CONSTRUCTION AS TESTED BY COMMITTEE OF MASTER CAR-BUILDERS' ASSOCIATION.

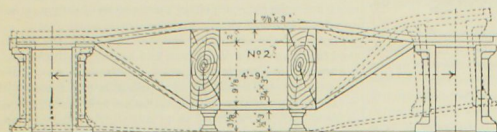
(See opposite page.)



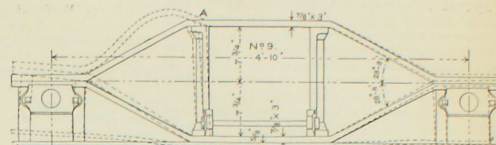
No. 1. Freight Truck, Chicago, Burlington and Quincy.



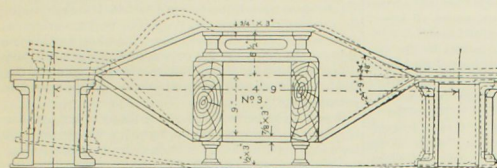
No. 8. Built for the Test.



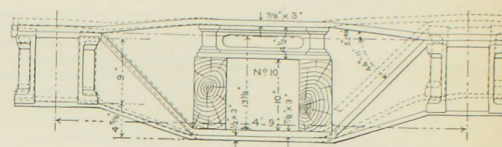
No. 2. Same as No. 1, except change of Arch-bars.



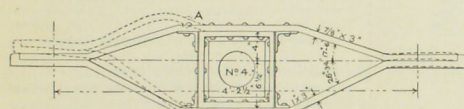
No. 9. "Cleveland" Truck.



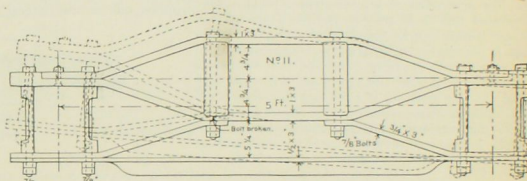
No. 3. Allen Truck as built by C. B. & Q. Road.



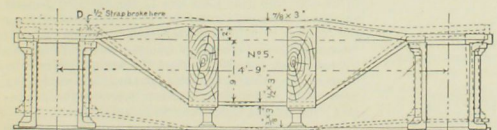
No. 10. Low Truck, built by C. B. & Q. Road.



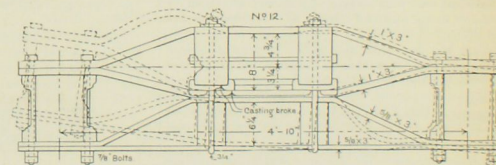
No. 4. Chalender Truck.



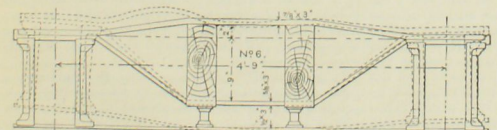
No. 11. New York Central Standard.



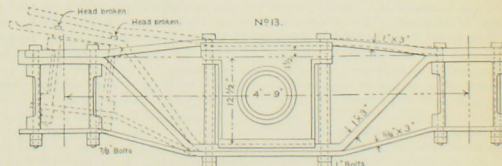
No. 5. Built for the Test.



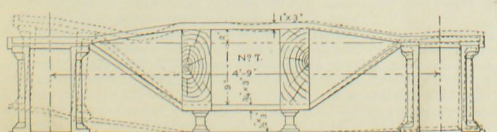
No. 12. Grand Trunk Standard.



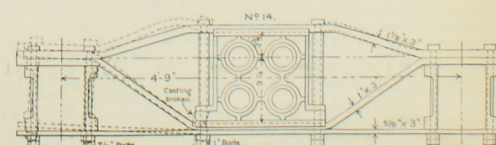
No. 6. Built for the Test.



No. 13. Low Truck, Michigan Central.



No. 7. Built for the Test.



No. 14. Old Standard, Michigan Central.



## Communications.

## Economy of the Extended Smoke-Arch.

To the Editor of the National Car-Builder:

I have noticed an article going the rounds of the newspapers in reference to the economy of what is known as the extended smoke-arch. This smoke-arch is made about four feet long and a sheet of 4x4 netting extends lengthwise of the arch over the flues, the nozzles being extended and passing through this netting. A straight stack with no cone or netting is used, as the cinders are retained in the smoke-arch, being prevented from passing out by the netting. This device is in use on several roads, and at a recent trial of the same, the economy was claimed to be fifty per cent. The actual facts in the case are, that the road testing the device does not weigh the coal used by the engines, it being shoveled from the pile into the tank, the head shoveler guessing at the amount and charging the engine with the result of his guess.

There was no difference in the amount of coal consumed as far as could be ascertained, the engineer agreeing that he had the same quantity left in the tank after the trip that he had before. Twice over the road it was necessary to clean the front end of cinders. Two openings, six inches in diameter, had been provided, through which the cinders ought to run out on the track. It was found that the engine worked enough water to wet the cinders, in which condition it was necessary to shovel them out the front end door, with a loss of time of fifteen minutes each cleaning. The newspapers reporting the trial, stated that there was an entire absence of cinders thrown from the stack, while it is evident that cinders which would pass through 4x4 netting must be continuously thrown from the stack. It was also found necessary to reduce the nozzles, owing to the obstructed draft when the smoke-arch became filled with cinders. Any person acquainted with the ordinary locomotive would have unhesitatingly pronounced the device a failure, as it is, although newspaper reporters enough can be found to herald it as a grand success. The ordinary locomotive on a passenger train will consume from 40 to 45 pounds and upwards of coal per mile. A saving of fifty per cent. would make the consumption from 20 to 23 pounds. The consumption in England with the best engines and their light loads (about half of the load of an American engine) is 30 pounds per mile. The application of the compound principle there has reduced this to 23 pounds, and with these facts in view, newspapers can be found which state that with no change in the manner of using steam, but the simple confining of a portion of the cinders in the front end results in an economy of fifty per cent. As well might it be claimed that the painting of a red ring around the stack would effect the same economy. The Keely motor and Fontaine engine belong to this class of inventions.

Happily in this case the trial showed the truth to which we can see a hole through a ladder.

V-HOOK.

## Locomotives and High Speed.

To the Editor of the National Car-Builder:

I have just read with considerable interest an article by David Joy, in the *Railroad Gazette*, on "Locomotives and High Speed."

I think Mr. Joy will find in the average American engines, carrying 130 pounds of steam by the gauge, that at 40 miles per hour the initial pressure in the cylinder is very close to 100 pounds, and it certainly would be a difficult matter to obtain 150 pounds in the cylinders, when four out of five American locomotives do not carry over 140 pounds per square inch by the gauge.

The writer advocates the link for a reverse gear, with a riding valve for expansion. When the link is cutting off very short, the indicator shows a narrow band, the exhaust and compression lines closely approximating the expansion line. These cards show good economy, but a very small development of power, when the size of the cylinder is considered. As high speed requires power as well as economy, and expansion is necessary to economy, and the link fails in the former, it appears as if the link were not the device to be used. Any of our high speed automatic stationary engines show the maximum of economy, and they allow of about 30 per cent. more work being performed in the same size of cylinder, and at the same point of cut-off, than is obtainable by the link. These high speed automatics use substantially the riding valve or its equivalent. The link at short points of cut-off gives a very limited opening of port, which results in wire drawing and its evils of loss of work, etc. The limited port opening requires a longer port and this again a longer valve, and in the same train follows the rapid wear of valve and seat, or the constant doctoring of a clap-trap balance device. As to the durability of the riding valve, it is only necessary to go into any of our large rolling mills where a train of rolls is driven by a high speed automatic, and notice the work done. I think that it will be found that these rolling-mill engines are doing far more work per size of cylinder, and at better economy than the locomotive as to repairs of valves and valve gear. My own experience shows that locomotives fitted with riding valves have run for five years without any appreciable "blow" or leakage, and

without the chest covers being lifted during that time. This will answer Mr. Joy's question as to their durability, and he himself admits the superior economy of the independent cut-off, in fact has a device of his own for driving the independent valve. I can see no reason then for questioning the superiority of the independent cut-off.

Mr. Joy says he is advocating the use of a larger cylinder and earlier cut-off (to obtain more power with the link), but will not this result in losses from condensation, which must result from a larger cylinder?

For some reason builders of locomotives and those interested in them neglect to make a comparison between the locomotive and our high speed automatics, in which the piston speed of the former is reached, and in which the greatest economy of repairs and steam consumption as well as the greatest capacity to develop work, is attained.

V-HOOK.

## The Forms of Nuts and Methods of Putting Them On.

To the Editor of the National Car-Builder:

Every one who has had much experience in car repair shops knows what a difference of opinion there is among workmen in regard to the best forms for nuts and the way in which they should be put on. Having been engaged in shops of this kind for many years, a few suggestions on this subject may not be without interest to some of your readers.

The old-fashioned check nut, which is still in requisition, often gives rise to controversies in the shops as to the most effective way of applying it, every workman, of course, adhering to such ideas as he has acquired during his apprenticeship. The common square nut, as we all know, has one side slightly concave or hollow, and the other a little convex or rounded, this form being caused by the cutting of the nut from the bar and the punching of the hole in its manufacture. The first or principal nut is usually screwed on with the hollow side towards the bearing. But if the question is raised why it should not be put on the reverse way the answer will frequently be that it does not look so well or that it has not been done so before. Some will assign other reasons, and I know of one road where the orders are to put the convex side towards the bearing, especially when a check nut is used, and put on so the hollow sides of the two nuts will face each other, as shown in Fig. 1. In other shops this mode is disapproved and even ridiculed, and the orders are to put on all nuts with the concave side towards the bearing, as in Fig. 2.

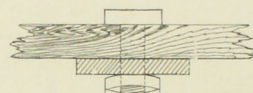


Fig. 1.

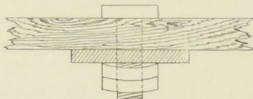


Fig. 2.

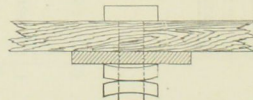


Fig. 3.

In carefully noting the results of these two methods I have found that the first nut screwed on as in Fig. 1 can be tightened better, because it has less friction to overcome, the rounded side presenting a smaller surface to the bearing. The nut, however, will for this very reason sooner unscrew itself when the wood begins to shrink, and as the second nut has been screwed on so as to form one solid nut with the first one they will both unscrew together and probably drop off the bolt. The method shown in Fig. 2 is undoubtedly the most correct as compared with Fig. 1; but here it will be found that in tightening the first nut its four corners press against the bearing and the nut becomes flattened; but when the second nut is put on it contracts this compression and restores the first nut to its original form. The result is, in many cases, that when the timber shrinks to any considerable extent both nuts will work off.

I have often tried another method, as shown in Fig. 3, and have found it to work better than either of those already referred to. The first nut is screwed on as in Fig. 2, but the second is reversed so as to bring the rounded instead of the concave sides in contact. The reason why this mode is to be preferred is quite obvious. Whatever grip or hold the first nut has is maintained by the check nut, which can be so tightened that the two can only be sepa-

rated by a wrench, although the wood may have shrunk so as to leave a space between the bearing and the first nut. To give the arrangement a more finished appearance perhaps it would be well to have both sides of the check nut rounded.

C. A. L.

## Wood Ceilings for Passenger Cars.

To the Editor of the National Car-Builder:

The last issue of your paper contains an article on the construction of passenger cars, in which the writer makes some excellent suggestions in regard to sharp points and corners of wood and metal work in inside finish. There are some other features that have been recently introduced in passenger-car construction that invite comment, and among these are the wood ceilings that have so extensively taken the place of canvas head-linings. It is a question with me whether these ceilings are really any improvement upon the old ones, either on the score of utility or in an artistic point of view.

First, as to the matter of weight. Allowing the wood used for this purpose to average  $\frac{1}{4}$  of an inch in thickness, the weight for a single car is about one-third of a ton. If any one has any doubt about it let him pile it up and weigh it. This, with a train of six cars, would be two tons, or about half the weight of an average load of paying passengers. This extra weight is not only an additional tax on the motive power, but being at the top of the car, it raises the center of gravity, and also acts as a lever in its effect upon the joints of the upper framing, and imposes an additional strain in going round curves. These ceilings are also liable to warp from the sun's heat that is absorbed by the car roof in summer, and the warm air from stoves or other heating apparatus in winter. The rafted air always rising to the top, keeps the ceilings constantly warm, and causes the rattling from shrinkage which is so often noticed. Their original beauty also may soon become impaired by use.

Now it seems to me that in discarding the linings that have been so long in use we are making a mistake that will have to be rectified sooner or later, either by bringing them again into use or by devising something better than the wood ceilings that are now so much in vogue. The canvas linings certainly do not rattle; they are much lighter in weight than wood, and if well painted with suitable ground color and decorative designs, they give a cheerful looking interior at much less cost. I should like to know the views of some of your readers on this subject, and especially of those who have practical experience in the putting on of wood ceilings.

FACTOR.

## The Floor Framing of Passenger Cars.

To the Editor of the National Car-Builder:

In a recent issue of the *Railroad Gazette* is an article illustrating and condemning the style of floor framing used in the wrecked passenger car in the Fourth avenue tunnel disaster, in your city. In this method of framing, the center and intermediate longitudinal sills are left out, and transverse timbers only are used. Many roads adhere to this plan, and I have visited wrecks where cars constructed in this way, and also with intermediate sills, were in the same train, and I am free to say that the greatest amount of suffering I ever heard of or saw resulted from the collision of a locomotive with a passenger car with intermediate sills in the floor framing, and in which the car rode up on the front end of the engine, one of the intermediate stringers fracturing the flue sheet and forcing itself nearly a third of the car's length into it, the passengers being scalded to death by the escaping steam.

The transverse plan of framing generally results in the car being split lengthwise, the engine acting as a wedge, as the cross-bolts holding the car floor together transversely bend and break. If the plan illustrated in the *Gazette* allows the engine to enter farther into the car, the stringer plan certainly has the fault of a greater liability for a fractured flue sheet. The truth of the matter is that it is useless to attempt to build a car strong enough to prevent an engine, running thirty or forty miles an hour, from entering the car in a collision. The censure belongs more properly to the management which made the accident liable to occur.

In an editorial in a late number of the above-named paper, it is suggested that in order to determine the weak points of a car, it might be allowed to run down an incline and strike another car. Previous to such an experiment, would it not be advisable to give more attention to the designing of a car? It does not appear that a car has ever been built on the same plan as a bridge; that is, by calculating the known strains to which it is to be subjected, and then experiment on the unknown ones. Will not some of our veteran car-builders favor your readers with an article dealing with the mathematical elements of the question? In the construction of passenger cars there is too much cut-and-try guesswork from foundation to turret. Will some one of these gentlemen demonstrate mathematically that there are not four or five tons of timber in a passenger car more than is necessary; that a lighter sill, a less number of braces, or lighter braces differently and scientifically arranged, would not make an equally strong car? It is not an un-



common thing to see box cars of different roads, both with the same size of sill, one with the sills strengthened by a tie-rod or "hog-chain" running beneath the sill, the other depending on the grade for strength. Which is right? The side of a freight car and the sill are open to the same calculations that a Howe truss or similar bridge is. Why, then, have we no exposition of the same from our learned car-builders?

CAR-BUILDER.

### Designing Locomotive Valve Gear.

To the Editor of the National Car-Builder:

It is generally known by mechanics that an ordinary slide valve, controlled by an eccentric, will not cut off equally at each end of the stroke—that is, will carry steam longer at one end of the cylinder than at the other. This is illustrated in Fig. 1, which is somewhat exaggerated in order to show the effect more clearly. In this Fig.,  $h h$  is a line passing through the cylinder center and axle center  $O$ , and  $K K$  is a line perpendicular to the line  $h h$ , and also passing through the center  $O$ .  $A B$  are the extreme points of travel of the cross-head, and  $e$  a point centrally between  $A B$ .  $e O$  will be the length of the main rod, and it appears, therefore, that when the cross-head is in its central position  $C$ , the pin is neither on the extreme top nor bottom quarter, but is in the distance  $E K$  or  $y K$  removed. When the cross-head is in its central position  $e$ , the pin may be at  $L$  or  $y$ , and if the pin travels in the direction of the arrow until the cross-head has moved from  $e$  to  $B$  and back to  $e$ , the pin has traveled from  $L$  to  $y$ , or the distances  $K L$  and  $y K$  short of a half circle, notwithstanding the cross-head has moved what is equivalent to a stroke of the piston. If the cross-head is now supposed to move from  $e$  to  $A$  and back to  $e$ , the pin has traveled from  $y$  to  $L$ , or the distances  $K y$  and  $L K$  more than one-half of circle  $G G$  2, described by the pin. As the eccentric is keyed fast to the shaft, it necessarily moves more or less of a half circle the same as the pin, while the cross-head is making equal movements; hence an irregularity is introduced which results in an unequal distribution of steam.

Attempts are sometimes made to correct this by unequal outside lap, but as this results in unequal lead, etc., it is commonly the practice in stationary work to use equal lap and lead, and allow the distribution to be longer on one end than on the other. To illustrate: If the pin be at  $R$  and the cross-head at  $B$ , and the engine be supposed to have no rocker shaft, the line  $O P$  may represent the center line of the eccentric. When the eccentric reaches a position corresponding to the line  $O U$ , it is assumed that the steam is cut off. Taking the distance  $R P$  which is the angle between the pin and eccentric center, and stepping it back from  $U$ , we find the pin to be at  $S$  when steam is cut off. With the length of the main rod  $O e$  stepped off from  $S$ , we have the position  $e$  of the cross-head at the moment steam is cut off. It appears, therefore, that the cross-head has traveled from  $B$  to  $e$  before steam is cut off. On the return stroke we find the eccentric at  $T$  when steam is cut off, and stepping back with the angle between the pin and eccentric center, locates the pin at  $m$ , and with the length of the main rod as before, we find the cross-head at  $d$ , showing that the cross-head has traveled from  $A$  to  $d$  before steam is cut off on the return stroke. The distance  $B e$  is manifestly greater than  $A d$ , and the steam is therefore carried longer while the piston travels from  $B$  to  $e$  than from  $A$  to  $d$ .

When the link was first introduced, it had the above fault of unequally distributing the steam, and it seems that no attempt was made in England to rectify it. At all events, D. K. Clark's treatise on railway machinery, the standard English authority on such matters, makes no mention of any such attempt as late as 1855, when the link was universally used in England. The ordinary mode of correcting this fault is by hanging the link back of its center on the saddle, and it is an American invention. The common shifting-link cut off in forward motion shortens the point of cut-off by being raised and lengthens it by being lowered.

Now, it is evident that if, while the action of the eccentric and cross-head tends to carry steam longer on one end than on the other, the link were raised, the valve and hence cutting off shorter than if the link were not raised. It is also clear that on the return stroke, when the uncorrected action would carry steam shorter if the link were lowered it would increase the travel of the valve and correct the fault by giving a longer point of cut-off, and, if this raising and lowering of the link were performed correctly, the steam might be made to follow the piston equally, or comparatively so. It would, of course, be impossible for the engineer to shift the reverse lever each stroke, and an automatic action to do this by shifting the reverse lever, would be complicated and difficult to apply.

In Fig. 4,  $a a$  is the center line of the link  $b$  suspension rod or hanger,  $c$  tumbling-shaft,  $d d d d$  are the ends of link makes around the center  $m$ ,  $f f$  being eccentric rods. It appears that the link in this case does not raise or lower materially from its action of swinging around the center  $m$ , disregarding the movement introduced by the arc described by the top end of the hanger  $b$ .

In Fig. 5,  $g g$  is the center line of link, and it is suspended at  $l$  back of the center. It is obvious that its

movement around  $l$  causes the link to move in the arcs  $h h h h$  which causes the link to raise and lower,  $j$  being hanger,  $K$  tumbling-shaft,  $i i$  eccentric rods. It will thus be seen why the faults of unequal distribution are present when the link is suspended from the center of the saddle, and how, by taking advantage of the irregularity introduced by hanging the link back of the center, it may be raised and lowered automatically, and thus lengthen and

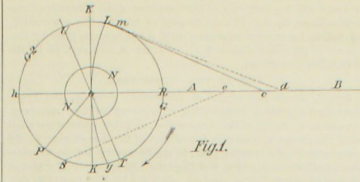


Fig. 1.

shorten the valve's travel so as to practically correct the distribution.

To determine the position of suspension on the hanger, the position of the tumbling-shaft and the length of the tumbling-shaft arms, etc., it is customary to use a model, although these points can be obtained by locating different points on a drawing by means of a template. Auchincloss' treatise on the link dispenses with a model. Owing to its apparent abstruseness many practical men do not approve of the method set forth in this work. I have used a modification of the method of Mr. Auchincloss (which will be illustrated hereafter) by out-

allow vertical adjustment of the rocker-arm. The casting  $j$  supporting the tumbling-shaft  $G$ , is of the same order. The upper arm of the tumbling-shaft being held by a thumb-screw in any position in the slotted piece  $E$  pivoted to frame at  $h$ . The link is slotted as shown at 1 and 2 to allow of vertical adjustment of the saddle, which is also slotted to allow of shifting the point of suspension. The lower tumbling-shaft arm is also slotted to adjust its length. The eccentric rods are of wood or steel and adjustable in the eccentric straps by slot,  $N$  is the main-rod attached to crank on opposite side of rods.  $K$  is the cross-head,  $L L$  the guides,  $m m$  2 are rules tacked on to guides and figured so as to measure the cross-head's travel each way.  $T$  is a hand-wheel for revolving the model  $V$  eccentric. The eccentrics are held to a short shaft by a nut bringing side pressure on to them; next to them is the hand-wheel, next the bearing held in a box bolted to  $A 1$ . Next on the other side of model comes the crank. In Fig. 3 is shown the eccentric with holes for different throws; the end view with strap  $s$  in place, shows part of the eccentric projecting and drilled full of holes, on which a spanner wrench is used to adjust the position of the eccentric.

If the valve motion is applied directly to the model, it is frequently a work of days to adjust the model until it gives the best results, as it is a "cut and try" process, and as the change in position of the rocker-arm tumbling shaft, length of tumbling-shaft arms, point of suspension of link on hanger, all influence the result, it is no very rapid method. The use of templates on a drawing is a

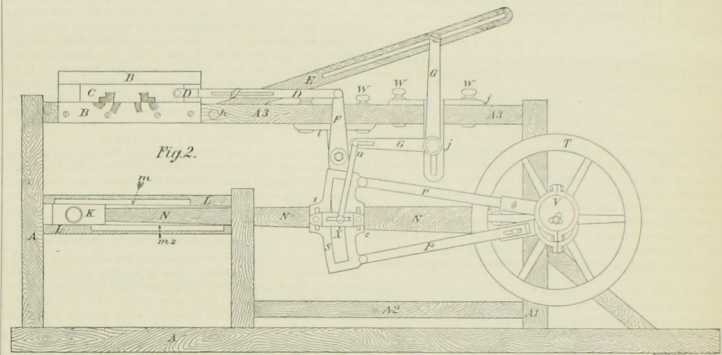


Fig. 2.

lining the bulk of a locomotive drawing, leaving the location of tumbling-shaft, rocker-arm, etc., to be determined. After determining these points by means of templates, etc., a model, shown in Fig. 2, was adjusted to the positions indicated, and the whole practically redetermined and touched up, after which the positions were located on the drawing from the model. Fig. 2 is such a model;  $A 1 A 2 A 3$  is the frame,  $B$  a piece of wood screwed on to the top piece of frame. The piece  $C$ , on which the valve is outlined, is dovetailed into  $B$  so as to slide back and forth. The valve stem  $D$  is capable of being lengthened or shortened by a slot and thumb-screw, as shown. The

progressive method, and has none of the "cut and try" principle. This method will be illustrated hereafter.

FRANK C. SMITH.

### Constitution and By-Laws of the Master Car-Builders' Association.

Adopted at the Meeting held at Niagara Falls, Oct. 10 and 11, 1882.

#### ARTICLE I.—NAME.

SECTION 1. The name of the Association shall be "The Master Car-Builders' Association."

#### ARTICLE II.—OBJECTS AND LIMITS OF ACTION.

SEC. 1. The objects of this Association shall be the advancement of knowledge concerning the construction, repair and service of railroad cars, by discussions in common, investigations and reports of the experience of its members; to provide an organization through which the members, and the companies they represent, may agree upon such joint action as may be required to bring about uniformity and interchangeability in the parts of railroad cars, to improve their construction and to adjust the mutual interests growing out of their interchange and repair; but the action of the Association shall have only a recommendatory character, and shall not be binding upon any of its members or the companies represented in it.

#### ARTICLE III.—MEMBERSHIP.

SEC. 1. There shall be three classes of members: Active, Representative and Associate members. Each member must be required to sign the constitution or authorize the Secretary to sign for him.

SEC. 2. Any person holding the position of Superintendent of the Car Department, Master Car-Builders, or Foreman of a Railroad Car shop, or one representative from each Car Manufacturing Company, or other company owning over one thousand cars which are not in process of purchase by other parties, may become an Active Member by paying his dues for one year. Unless expelled from the Association, his membership shall continue until his written resignation is received by the Secretary.

SEC. 3. Any person having a practical knowledge of car construction may become a Representative Member by receiving a written appointment from the President, General Manager or its interests in the Association, provided that no Representative Member shall represent more than one railroad or system of roads under one General Manager or General Superintendent. Such members shall have all the privileges of an Active Member, including one vote on all questions, and in addition thereto, shall on all measures pertaining to the adoption of standards or the ex-

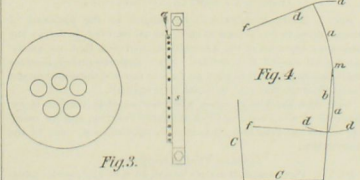


Fig. 3.

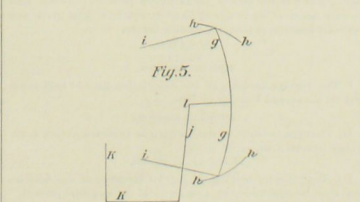


Fig. 4.

rocker-arm is made of No. 10 stack steel, as is the link, and saddle. The rocker-arm can be adjusted fore and aft by means of the casting  $i$  (to which it is held) by means of the thumb-screws and a slot in the frame  $A 3$ . The casting  $i$  supporting the rocker-arm is slotted so as to



penditure of money have one more vote for each full one thousand cars which are owned, or which are in use and in process of purchase, by the road or system which he represents. His membership shall continue until notice is given by the Association of his withdrawal, or of the appointment of his successor. No railroad or system of roads under one general manager or general superintendent shall have more than one Representative Member. In the enumeration of four, six, eight, or more wheeled cars, four axles to count as one car.

SEC. 4. Civil and mechanical engineers, or other persons having such a knowledge of science or practical experience in matters pertaining to the construction of cars as would be of especial value to the Association or to railroad companies, may become Associate Members on being recommended by three members not associates. The names of such candidates shall then be referred to the Executive Committee, which shall report to the Association on their fitness for such membership. They shall be elected by ballot at any regular meeting of the Association, held not less than six months after a candidate has been proposed, and five dissenting votes shall reject. The number of Associate Members shall not exceed twenty. Any Associate Member who shall fail to attend a meeting of the Association for three consecutive years shall cease to be a member. Associate Members shall be entitled to all the privileges of Active Members, excepting that of voting and being elected to office in the Association.

SEC. 5. Any member who, during the meetings of the Association, shall be guilty of dishonorable conduct, which is disgraceful to a railroad officer and a member of the Association, or shall refuse to obey the Chairman when called to order, may be expelled by a vote of two-thirds of the members present at any meeting held within one year from the date of the offense.

#### ARTICLE IV.—OFFICERS.

SEC. 1. The officers of the Association shall be a President, three Vice-Presidents, a Treasurer, Secretary and six Executive Members. The six Executive Members with the President, Vice-Presidents and Treasurer shall constitute the Executive Committee.

#### ARTICLE V.—DUTIES OF OFFICERS.

SEC. 1. The duties of all officers shall be such as usually pertain to their offices, or may be delegated to them by the Executive Committee or the Association.

#### ARTICLE VI.—EXECUTIVE COMMITTEE.

SEC. 1. The Executive Committee shall exercise a general supervision over the interests and affairs of the Association, recommend the amount of the annual assessment, to call, to prepare for and to conduct general conventions, and to make all necessary purchases, expenditures and contracts required to conduct the current business of the Association, but shall have no power to make the Association liable for any debt to an amount beyond that which at the time of contracting the same shall be in the Treasurer's hands in cash, and not subject to prior liabilities. All expenditures for special purposes shall only be made by appropriations acted upon by the Association at a regular meeting.

SEC. 2. The Executive Committee shall make a report of the proceedings of each of its meetings, such reports to be made accessible to all the members of the Association. It shall have the proceedings of the regular meetings of the Association published, subject to instructions from the latter. It shall have power to withhold from the published proceedings papers, those specially meant to advocate personal interests, those carelessly prepared or containing matter readily found elsewhere, and those purely speculative or foreign to the purposes of the Association, or any which in the opinion of the Committee are unworthy of publication; it being understood, though, that this discretion shall always be exercised subject to the action of the Association.

SEC. 3. Two-thirds of the members of the Executive Committee may call special meetings of the Association to be held not less than thirty days after a notice thereof has been mailed to each member of the Association.

SEC. 4. Five members of the Executive Committee shall constitute a quorum for the transaction of business.

#### ARTICLE VII.—ELECTION AND APPOINTMENT OF OFFICERS AND TENURE OF OFFICE.

SEC. 1. The officers, excepting as otherwise herein provided, shall be elected at the regular meeting of the Association, held in June of each year, and the election shall not be postponed excepting by unanimous consent.

#### PRESIDENT AND TREASURER.

SEC. 2. The President and Treasurer shall be elected by written ballots by a majority of the votes cast, and shall hold office for one year, or until successors are chosen.

#### VICE-PRESIDENTS AND EXECUTIVE MEMBERS.

SEC. 3. The Vice-Presidents shall hold office for one year and the Executive Members for two years, or until successors are chosen. Three Vice-Presidents and three Executive Members to be elected each year, provided, however, that three of the latter shall be appointed by the President holding office at the time of the adoption of this amendment. The Executive Members thus appointed to hold office until successors are chosen at the annual meeting following.

SEC. 4. In the election of Vice-Presidents, each Active and Representative Member may cast as many votes as there are Vice-Presidents to be elected. The number of votes may be given to one candidate or distributed among more, as the person entitled to cast them may choose. Executive Members shall be voted for in the same way. The three candidates, for each of the offices named, who receive the largest number of votes shall be declared elected.

#### SECRETARY.

SEC. 5. A Secretary, who may or may not be a member of the Association, shall be appointed by a majority of the Executive Committee at its first meeting after the annual election, or as soon thereafter as the votes of a majority of the members of the Executive Committee can be secured for a candidate. The term of office of the Secretary thus appointed, unless terminated sooner, shall cease at the first meeting after the next annual election succeeding his appointment, of the Executive Committee

organized for the transaction of business. Two-thirds of the members of the Executive Committee shall, however, have power to remove the Secretary at any time. His compensation, if any, shall be fixed for the time that he holds office by a vote of a majority of the Executive Committee. He shall also act as Secretary of the Executive Committee.

#### TREASURER.

SEC. 6. The Treasurer shall be required to give bonds to an amount which a majority of the members of the Executive Committee demand. No bill shall be paid by him for the Association, excepting for current expenses, until it has been certified by the person or persons authorized to contract it, and audited by the Executive Committee.

#### ARTICLE VIII.—COMMITTEES.

SEC. 1. At the first session of the annual meeting, the President shall appoint a Nominating Committee of five members, who are not officers of the Association, and this committee shall send the names of nominees for officers of the Association to fill vacancies for the ensuing year, to the Secretary before the election of officers is in order, and they shall be announced by him as soon as received. The election shall not be held until the day after such announcement excepting by unanimous consent. Any three other members may nominate candidates for any office.

#### AUDITING COMMITTEE.

SEC. 2. At the first session of each annual meeting an Auditing Committee, consisting of three members not officers of the Association, to be nominated by any member who does not hold office, shall be elected in the same way as Vice-presidents and executive members are voted for. This Auditing Committee shall examine the accounts and vouchers of the Treasurer and certify whether they have been found correct or not. After the performance of this duty they shall be discharged by the acceptance of their report by the Association.

#### COMMITTEE ON SUBJECTS FOR INVESTIGATION AND DISCUSSION.

SEC. 3. At each annual meeting the President shall appoint a committee whose duty it shall be to report at the next annual meeting subjects for investigation and discussion, and if the subjects are approved by the Association the President, as hereinafter provided, shall appoint committees to report on them. It shall also be the duty of the Committee to receive from members questions for discussion during the time set apart for that purpose. This Committee shall determine whether such questions are suitable ones for discussion, and if so, they shall so report them to the Association.

#### COMMITTEES OF INVESTIGATION.

SEC. 4. When the Committee on subjects has reported and the Association approved of subjects for investigation, the President shall appoint special committees to investigate and report on them, and he may be authorized to appoint a special committee to investigate and report on any subject which a majority of the members present may approve of.

#### ARTICLE IX.—THE RECOMMENDATION OF STANDARDS.

SEC. 1. Any proposition recommending the adoption of standard constructions or practice shall be in writing and be accompanied by drawings, if the latter are necessary for a clear understanding of the subject. Such proposition shall then be submitted to the Association for discussion, after which a vote shall be taken to decide whether the proposition shall be submitted for decision by letter ballot to all the members entitled to vote. If decided in the affirmative the Secretary, within three months from the time the vote of the Association is taken on such measure, shall send by mail to each member a blank ballot, and a copy of the proposed recommendation, with a report to be approved by the Executive Committee of the discussion thereon. Such ballot to be filled up, signed and re-mailed to the Secretary, who shall count all the ballots received within sixty days from the date that they were sent to members, and he shall then announce the vote in such manner as the Executive Committee may prescribe. Any recommendation securing two-thirds of the votes cast shall be adopted by the Association.

SEC. 2. All reports, resolutions and recommendations involving the use, or proposed use, by railroad companies of any device or process which forms the subject matter of any existing patent, shall first be submitted to the Executive Committee and shall be submitted to the Association only by the Executive Committee.

#### ARTICLE X.—ANNUAL CONTRIBUTIONS.

SEC. 1. Every member will be subject to the payment of annual dues, to be assessed at each annual meeting, to defray the necessary expenses of the Association, provided that no assessment shall exceed five dollars. Each Representative Member shall pay in addition to his own dues so assessed the same amount for each additional vote to which he is entitled.

Such dues shall be payable when the amount thereof is announced by the President at each annual meeting, and no member who is one year in arrears shall be entitled to a voice in the Association.

#### ARTICLE XI.—AMENDMENTS.

SEC. 1. This constitution may be amended at any regular meeting by a two-thirds vote of the members present, provided that written notice of the proposed amendment has been given at a previous meeting at least six months before.

#### BY-LAWS.

##### TIME OF MEETING.

I. The regular meeting of the Association shall be held annually on the second Tuesday in June.

##### HOURS OF SESSION.

II. The regular hours of session shall be from ten o'clock a. m. to two o'clock p. m.

##### PLACE OF MEETINGS.

III. The place for holding the regular meetings of the Association shall be determined by a majority of the members present.

##### QUORUM.

IV. At any regular meeting of the Association fifteen or more members entitled to vote shall constitute a quorum.

##### ORDER OF BUSINESS.

V. The business of the meetings of this Association shall, unless otherwise ordered by a vote, proceed in the following order: 1st, Calling the roll,

2d. Reading the minutes of the last meeting.

3d. Address by the President.

4th. Admission of new members.

5th. Reports of Secretary and Treasurer.

6th. Assessment and announcement of annual dues.

7th. Appointment of Nominating and other committees.

8th. Election of Auditing Committee.

9th. Unfinished business.

10th. New business.

11th. Reports of committees.

12th. Reading and discussing questions propounded by members.

13th. Routine and miscellaneous business.

14th. Election of officers.

15th. Adjournment.

#### QUESTIONS FOR DISCUSSION, SPECIAL ORDER OF.

VI. Unless otherwise ordered, the discussion of questions proposed by members shall be the special order at 12 o'clock m. of each day of the annual meeting.

#### DECISIONS.

VII. The votes of a majority of the members present shall be required to decide any question, motion or resolution which shall come before the Association, unless otherwise provided.

#### DISCUSSIONS.

VIII. No questions or discussions as to the regulation of wages, or the amount to be paid by the day, week or month, or the number of hours that shall constitute a day's work, shall be allowed at the meetings of this Association.

IX. No patentees or their agents shall be admitted in the meetings of the Association for the purpose of advocating the claims of any patent or patentee, unless by unanimous consent.

X. No member shall speak more than twice in the discussion of any question until all the other members who want to speak and have not been heard have spoken.

### Standard Drop-Bottom Gondola Car.—New York Central & Hudson River Railroad.

#### GENERAL DIMENSIONS.

Length outside of sills..... 29 ft. 0 in.  
Width outside of sills..... 8 " 6 "  
Height, top of floor to top of sides..... 2 " 8 "

#### BODY TIMBERS (FINISHED SIZES).

2 Side Sills..... Ga. pine, 4 1/2 " x 12 " x 28 ft. 5 in.  
2 Intermediate Timbers..... 2 1/2 " x 8 " x 28 " 5 "  
2 Center Floor Timbers..... 4 1/2 " x 8 " x 28 " 5 "  
4 Short Intermediate Timbers..... 2 1/2 " x 8 " x 11 " 8 "  
2 End Sills..... Wh. oak, 5 " x 9 1/2 " x 8 " 10 "  
2 Tie Timbers..... 4 " x 11 " x 8 " 6 "  
4 Draw-Bar Timbers..... Ga. pine, 5 " x 6 " x 8 " 9 1/2 "  
2 Draw-Bar Center Timbers..... 4 1/2 " x 5 " x 6 " 2 "  
2 Draw-Bar Timbers..... Wh. oak, 6 1/2 " x 8 " x 1 " 6 "  
2 Buffer Blocks..... 6 1/2 " x 5 1/2 " x 2 " 2 "  
2 Brake-Hanger Timbers..... 4 " x 8 " x 1 " 3 1/2 "  
2 Transom Bearing Timbers..... 4 1/2 " x 9 " x 8 " 10 "  
16 Side-Stakes..... 3 1/2 " x 4 in. bottom, 2 1/2 " x 4 in. top, 3 ft. 5 1/2 in. long.  
8 Swing-Stakes..... 2 1/2 " x 6 in. bottom, 2 1/2 " x 3 in. top, 6 ft. long.

2 Pieces for side of drop opening..... Ga. pine, 4 1/2 " x 8 in. x 7 ft. 6 in.  
2 Pieces for side of drop opening..... 2 1/2 " x 6 " x 6 " 1 1/2 "  
4 Pieces for end of drop opening..... 2 1/2 " x 8 " x 2 " 1 1/2 "  
Drop Door..... Oak or pine, 2 1/2 in. thick x 5 ft. 4 in. long.  
Side and End Plank Ga. pine, 2 1/2 in. thick.  
Flooring..... 1 1/4 in. thick, not over 6 in. wide, planed, tongued and grooved 3/4 in. from face, tongue 3/4 " x 1/2 " edge rounded.

#### CONSTRUCTION.

**Framing.**—Side sills, center floor and intermediate timbers framed to end sill by double tenons as follows: Commencing at top, 1 1/2-in. shoulder, 1 1/2-in. tenons, 2 in. spaces, and 1 1/2-in. tenons, and 1 1/2-in. shoulder; end sills, center floor and intermediate timbers placed, and side sills beveled at ends; and sills to have 1/2-in. bolt through end to prevent splitting, and fastened to center floor timbers by two 3/4-in. joint bolts 12 in. long; short intermediate timbers framed into end pieces for drop opening; end pieces of drop opening framed into center floor timbers and side pieces for drop opening, and fastened to center floor timbers by 3/4-in. rods passing through side piece of drop opening and center floor timbers; side piece of drop opening fastened to cross frame tie timbers with 3/4-in. bolt. Center of bolster 4 ft. 10 in. from outside of end sill. The distance from outside of end sill to center of cross frame tie timber 11 ft. 3 in.; the center and intermediate floor timbers to be gained and side sill boxed out 1/4 in. to receive cross frame tie timbers; end of cross frame tie timbers sized off 4 1/2 in. to receive side sills, and fastened to side sills and center floor timbers with one 3/4-in. bolt in each timber, and to intermediate timbers with one 1/2-in. bolt in each timber, bearing timbers placed on top of sills and floor timbers directly over transom and fastened to same.

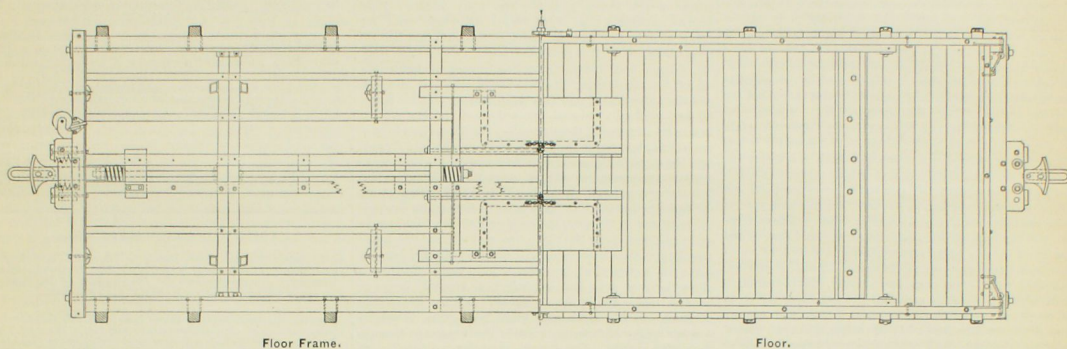
**Body Bolsters.**—Bolsters to be made of wrought iron, top iron 8 x 1 1/2 in., bottom iron 8 x 5/8 in., welded at the ends, and formed as shown; bolsters locked into floor timbers 1/4 in. and fastened to sill with cast-iron pocket bolted to sill to receive end of transom, center timbers fastened to bolster with two 3/4-in. bolts in each timber through bearing timbers, center timbers, draw timbers and center plate; two pieces of 3/4-in. gas pipe, 5 in. long, through draw bar timbers to receive bolts through bearing timbers, center floor timbers, bolster and center plate; each intermediate timber and bearing timber fastened to bolster with two 1/2-in. bolts.

**Draw Bar.**—D. Holt's double spring draw bar and buffer. **Buffer Blocks.**—Buffer blocks held in position by two pieces of 3 x 1/2 in. wrought iron, mortised into end sills 2 in. deep, 5 in. from bottom, and passing out of buffer block 3/4 in. to receive iron; other end passing out under buffer block 4 in. and fastened to buffer block and end sill; buffer block is also fastened to above



A detailed technical side-view drawing of a steam locomotive. The locomotive is oriented horizontally, with its front (right side) facing right. It features a large horizontal boiler with a tall smokestack at the front. The locomotive is supported by four large wheels: two smaller front wheels and two larger rear wheels. Various mechanical components, including the piston, connecting rods, and valves, are shown in detail. The drawing is a black and white line drawing, typical of engineering plans.

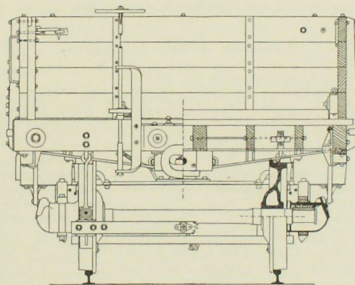
Longitudinal Section and Side Elevation.



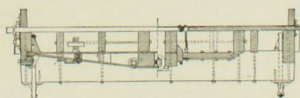
### Floor Frame.

Floor.

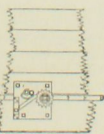
*Brakes*.—Brake standard to be made of  $1\frac{1}{2}$ -in. round wrought iron, with an enlargement at lower end, 8 in. long by  $1\frac{1}{2}$  in. diameter, forming drum for chain to wind upon; to be fastened



End Elevation and Section.



### Half Cross Sections.



Elevation of Windlass.

Wrought iron, body of car.....	2,442 lbs.
Cast " " ".....	631 "
Steel, " " ".....	94 "
Wrought iron, truck, including axles.....	3,144 "
Cast " " " wheels.....	5,366 "
Malleable " " ".....	48 "
Journal bearings, truck.....	80 "

A correspondent of the Boston *Herald* writes as follows :

"In German railroads are ornamental as well as useful, and railroad cars are built more for comfort than for show. A great deal has been said against the compartment plan, and because several unfortunate occurrences are recorded for which the system was in some measure responsible, the criticisms which have been poured out upon it have been very severe, yet I have not met a single American in Germany who does not prefer it to the public cars in use at home. By the judicious expenditure of a very small amount of money in the shape of fees, it is the easiest thing in the world to travel like an Oriental prince on a German railroad. If you are traveling alone and you prefer to be alone, about 50 cents in addition to your fare will secure you an elegant apartment, upholstered in plush to such an extent that if the train should jump down an embankment your sacred person might be tossed from one side to the other fifty times without coming into collision with a sharp angle. You have at your disposal a compartment originally intended to accommodate eight persons, which it will do very nicely, and you can seat yourself or lie in any position which your taste may indicate or your experience suggest. You are alone, with a large, elegantly- curtained window on either side, and if you tire of looking out of one, you can look out of the other. If you would like a lunch you can have it, and very cheaply, at the first convenient station. The schaffner will see that you are served with it expeditiously, and you can eat as leisurely as you could in an American dining car. The train moves away, leaving you in possession of the dishes and other property belonging to the Balmhaf eating house, but that is all right. The schaffner will relieve you of them, and have them back to the owner on his return trip. Likewise, if you want a glass of beer, or a bottle of light wine, you have only to order it. The best comes to you with a snow-white head upon it, and you



need not be in a hurry about swallowing it. The glass, like the other things, will be returned in due time. For these services the schaffner will be very thankful to you if you give him a mark, or about 24 cents. Then, after your repast, if you would like to smoke, there is not a soul on earth to hinder you or bid you nay. You can walk up and down the little aisle and stretch your legs, or you can put your feet upon the opposite cushion and throw your body snugly up against one of the upholstered corners and puff away to your heart's content. And after your smoke, and you find that the process of digestion is unobstructed, you can lift up the arm which divides the seat into two compartments, pull out the seat itself, so that you may have more room, and lay yourself out at full length as comfortably as if you were in one of the finest hotels in Boston. They have not even neglected to provide pillows upon which you may rest your head. No need here to crack your head over the sharp-edged bottom of a valise. You are undisturbed save by the schaffner, who looks in upon you occasionally and tells you how many minutes the train will stop at this, that and the other station, so that, if you are in want of anything, you have only to mention it. If it is winter, you are more comfortably situated than you ever dreamt of being on an American railroad train. The windows are all double, and neither the cold nor the cinders from the locomotive can penetrate your palace. You are within reach of two tasseled cords, however, one of which you pull to open and the other to close an ingeniously-constructed ventilator near the roof of the coupé. By paying a little attention to these cords you can regulate the supply of oxygen to suit yourself. But this is not all. You are master of the heating apparatus. Above your head is a nickel plate, bright and shining. On this plate are the words, "Cold" and "Warm." Between the words is a little ivory-tipped arrangement which resembles the handle of the gong door bell, and which moves to the left and right upon a pivot. If you want your compartment warm, you move the handle toward "warm," and you reverse the movement if you want it cold. Between the two you can regulate the temperature as you desire it, and you never have to go out on the platform to cool off, as I have seen passengers do in America. And, if you are traveling with your wife and family, the advantages of the German coupé shine out all the brighter. It costs but a trifle to insure the compartment which you occupy against all intrusion, the said trifle being, of course, placed upon the hospitable palm of the schaffner when he calls to take your tickets. If you are liberal with him—that is, if you give him a few cents more than he expects—your wife may use him as her devoted attendant, and make all her wants and wishes known. If they are not unreasonable, he will see that she is made content. Bread and butter for the children, oranges for the children, lemonade for the children, candy for the children, tea or coffee for herself—anything that is wanted the schaffner will send to you at prices that defy competition. If the children are sleepy, as they are apt to be, there is plenty of room for them to lie down, without in the slightest degree interfering with the comfort of their parents. And if you are traveling with a friend, or a party of friends, you will find that the conveniences are so numerous, and the journey can be made so sociable and pleasant, that you will wonder how you ever endured the tortures of the monotonous, high-backed, narrow, uncomfortable American railroad chair, or the stifling heat and suffocating atmosphere of the American railroad car."

#### Working of Electric Signals.

A very satisfactory test of the working of the so-called "close circuit" system of signaling, was made on the Providence & Worcester road, Oct. 2. This system is controlled by the Union Switch & Signal Co., of Pittsburg, Pa. The following description is from the Providence Press:

"The signals are set in blocks or sections, and in number as the character of the road may require, a curving roadway requiring more than one with miles of straight track. At one end of the section or block is placed the battery, consisting of a single cell, which will operate through a mile of track, one pole attached to either rail, while at the opposite end is placed the magnet, one electrode attached to either rail, thus establishing a constant metallic circuit through the rails and magnet, the circuit being made perfectly reliable by connecting the rail-joints with wire. Experience has shown that this apparatus is perfectly free from atmospheric influences. The rails being metal, of very large cross-section, and consequent great conductivity, are vastly superior as conductors to any surrounding media, and hence the electricity adheres to the rails and keeps the magnet magnetized, even during the heaviest rain or snow, in preference to passing off into the earth. The magnet keeps the signal indicating 'all clear' as its normal condition, but when a train enters upon the section the wheels and axles short-circuit the current, because they are better conductors than the small wire of the magnet; and the magnet being thus demagnetized, releases its armature and the signal is instantly thrown to 'danger,' and remains there as long as any part of the train is on the section or block, warning all after comers to a halt. Tearing up a rail or breaking one interrupts the electric current and the signal goes to 'danger,' and it is impossible for it to say 'safety' until the damage is repaired. Should the battery be too long neglected, go to sleep, say, at its post, like some human watchman, or become broken, 'danger' is the signal until 'safety' is established. In brief, the system is just this: So long as the current of electricity is maintained and the track is clear, the signal says 'safety'; interrupt that current by placing rails across the track,

running a train upon it, or leaving a car on a block, and the signal returns to its normal condition of 'danger.'"

The sensitivity of the signal to any obstruction of the electric current was shown by connecting the rails with a small brass wire, when the signal, many yards away, would show its danger face instantly. It is said to be impossible for a collision to occur if the engineers obey the signals.

"During the month of September 3,175 trains passed over the Worcester road between Providence and the Boston switch, and there were but six of them stopped by any trouble with the mechanism or circuits of the system. These trains each operated 20 block signals, making 63,500 operations for one signal, or one train stopped unnecessarily in 9,916½ circuit operations. One hundred and twenty trains were stopped by trains on section ahead, or by switch being in use in the section, and one train was stopped by a signal on account of a broken rail."

#### Very Light Cars.

Mr. F. D. Adams, of the Boston & Albany Railroad, recently turned out a pair of parlor cars for the fast Boston and New York express which are rather remarkable, to say the least, from a car-builder's standpoint. They have 42-inch paper wheels, the journals are 3½ by 7, and the trucks weigh 18,000 pounds; the body weighs 27,000 pounds, making a total of 45,000 for the whole car. We think this is the lightest coach of the kind that has yet been turned out. It is now some ten or twelve years since Mr. Adams first directed attention toward the lightening up of his car bodies. By the careful selection of wood, and the reduction of useless weight at every possible point, he has gradually reduced the weight of his cars without in any way lessening the strength. At the present time, we believe, he uses an arch in the side of the car, framed into the posts in the place of a truss plank. By this means a very considerable amount of dead weight is saved, and it is claimed that the strength is fully equal to that of the old-fashioned plank. In the matter of furring up between the posts and in the roof, the greatest care is taken to have every piece precisely the right size and shape, and never any larger than is necessary. This is a trifling item, but it is a key to the whole question of light cars. No piece is allowed to go into the car which is in any way larger or heavier than is absolutely necessary. Before the change of gauge on the Erie road there were some passenger coaches built which were probably the nearest to these in their dead weight. The figures, however, we have not at hand at the present moment. If we recollect rightly, some of the broad-gauge eight-wheel, 72-passenger coaches, with one saloon, weighed about 34,000 to 35,000 pounds. They, however, had only 33 inch wheels.—Iron Age.

#### Locomotive Building in England.

The London Engineer, Oct. 13, says:

"Locomotive builders in Manchester have plenty of work in hand for export, and we may add a few particulars with reference to a number of specially designed engines for steep gradients and sharp curves, which Messrs. Nasmyth, Wilson & Co., Limited, of Patricroft, near Manchester, are constructing for two of the South American railway companies. One order is for the Saniga & Carracas Railway Company, and the engines are constructed to travel on gradients averaging about 1 in 26, with curves in some cases of 140 ft. radius. The engines have only a 3 ft. gauge, but are fitted with cylinders of 14 1/2 in. diameter and 22 in. stroke, and supplied with Joy's patent valve motion. To enable the engines to pass round sharp curves a special arrangement is introduced. The engines are carried on six coupled wheels, with a four-wheel bogie, and the six coupled wheels are kept as close together as possible under the barrel of the boiler, the rigid wheel base being only 6 ft. 5 in., whilst the bogie has a lateral play of 3 in. or so each way, in addition to the swivelling movement. The locomotives are tank engines, carrying their own water and fuel, weighing altogether 38 tons when in working order, and are constructed to take a load of 80 tons up continuous gradients of 25 miles. Passenger engines of similar construction but of heavier weight, having 16 in. cylinders, and 24 in. stroke, with four coupled wheels and four-wheeled bogie in front, are being constructed for the San Paulo Railway, South America, and the firm have also in hand an order for the Bengal Central Railway."

The Pullman Palace-Car Co. is constructing for the New York, Chicago & St. Louis Railroad, a train, which, when completed, will be the finest "limited" ever run between the East and West. The train consists of one baggage-car, one smoking-car, one dining-car, and two sleepers. The platforms are to be inclosed, thus making it practically one continuous car. The sleepers are of the standard make and latest design, and are most beautifully decorated. Besides this train, the Pullman Co. has ready for immediate delivery to the "Nickel-Plate" road the following equipment: 24 first-class passenger coaches; 10 second-class passenger coaches; 4 baggage and mail cars, and 10 baggage cars. The Pullman Co. has the contract for the sleeping-car service on the line, and by the terms of the same it is to furnish enough of the latest style cars to accommodate all demands.—Railway Register.



PUBLISHED MONTHLY

R. M. VAN ARSDALE,

MORSE BUILDING, CORNER NEW YORK.

JAMES GILLET, Editor.

FRANK C. SMITH, M. E., Associate Editor.

NOVEMBER, 1882.

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#### EDITORIAL ANNOUNCEMENTS.

Addresses.—Business letters should be addressed, and drafts and money orders made payable, to THE NATIONAL CAR-BUILDER. Communications for the attention of the Editor should be addressed EDITOR NATIONAL CAR-BUILDER.

Advertisements.—Nothing will be inserted in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. The editorial Department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.

Contributions.—Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.

Special Notice.—As the CAR-BUILDER is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.

SUBSCRIPTIONS to the CAR-BUILDER will be received, and copies kept for sale, at the following places:

A. WILLIAMS & Co., 283 Washington St., Boston, Mass.  
L. SCHAFFNER, Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.

WILLIE H. GRAY, 306 Olive Street, St. Louis, Mo.  
ROBERT CLARKE & Co., 65 West Fourth Street, Cincinnati, Ohio.

#### Back Numbers of the Car-BUILDER Wanted.

Our supply of May and September numbers for 1883 having been exhausted, we will pay 15 cents a copy for any that may be sent us.

MR. FRANK C. SMITH, of Delaware, Ohio, will from this time forward be connected with the CAR-BUILDER in the capacity of Associate Editor. Mr. Smith, although a young man, is a Mechanical Engineer of experience and ability, and is already favorably known to our readers by his contributions to our columns and to other journals of the same class. His practical familiarity with the mechanical departments of railroads, and more especially with the construction and management of locomotives, eminently fit him for his new duties. He will visit the machine and car shops of the roads as a representative of the CAR-BUILDER, and any facilities that may be furnished him for obtaining information for publication in our columns will be duly appreciated.

#### THE MASTER CAR-BUILDERS' ASSOCIATION.

The work of reorganizing the association, which was initiated a year and a half ago, has been completed at Niagara. It is no longer an open question, and it would seem, therefore, that any comment other than what is favorable is uncalled-for. Whatever doubts we may have had as to the expediency of introducing the so-called representative element into the association, we now dismiss, and if any such doubts still linger in the minds of others who have for years been laboring to build up the organization and extend its usefulness, we would suggest that it is no more than fair to lay them aside, in the confident hope that in a year or two it will be shown that they are



without foundation. The fact should not be lost sight of that the necessity for some kind of reorganization that should put the association on a better footing has long been apparent, and that the movement, since it first took definite shape, has been directed and carried through all its stages by the members of the old organization, and with remarkable unanimity. The proposition to amend the constitution, which was brought forward last summer at Philadelphia, and which contained the pith and marrow of the whole thing, was adopted without dissent, so far as appeared upon the surface. If there was any misgiving, it found no expression; if any member voted blindly, he did so with his eyes wide open; nor was there any undue precipitation. This language must not be understood as apologetic. We do not so intend it. We merely state the fact that the old association reconstructed itself, and so far as now appears, it did a good thing.

The old constitution was a rickety affair, and of very little account. The new one, together with the by-laws, is a very well constructed piece of machinery. It must be borne in mind, however, and especially by those who are naturally hopeful and sanguine, that a piece of machinery may be ever so complete in itself, but if its practical working is committed to incompetent hands, the results will fall short of the expectation. A ship may be ever so staunch and finely modeled, but if the crew is badly selected and mutinous, it will be as likely to go on the rocks or to the bottom as anywhere else. We hardly need say, in the words of the oracular Bunbury, "that the bearings of this observation lays in the application of it." The Car-Builders' Association is now, and will be in future, just as much of a voluntary association as it has been in the past. It exists and is controlled by no force of law, and the objects it seeks to attain will depend quite as much on the character of the membership as on the disposition of the railroad companies to adopt its recommendations. Every voting member should not only have a practical knowledge of car-building from actual experience as a superintendent or foreman of car-shops, but he should also know how to co-operate with his fellow-members in routine and committee work, and in the general sessions of the association, so as to be a help instead of a hindrance. To be a useful member of a deliberative body of any kind requires a peculiar combination of qualities. A man may be brimful of knowledge, so much so, in fact, as to be incapable of learning anything more, but if he is too tenacious and opinionated, and plumes himself too much on his individuality, he will be more of an obstruction at the council board than anything else. In the affairs of life the three-cornered man must sometimes adapt himself temporarily to a square hole, because it is impossible to gather in one association any considerable number of men of the same mental configuration. In most deliberative assemblies the gift of oratory is not essential; but the ability to make a clear, unambiguous statement of one's views, so the ideas will not be smothered in a cataract of words, is highly desirable in the discussion of matters pertaining to the mechanics of car construction. Even if a person has no capacity for speech-making, if he is a clear and careful thinker he can hardly fail to be a valuable member. It should, therefore, be the first concern of railroad officials in the appointment of representative members to make the best possible selection. The association, also, in the admission of active members hereafter, should have regard to other considerations than the mere increase of numbers, for the reason that its future well-being and efficiency will largely depend upon the collective character of the membership.

There is another matter about which we are reluctant to write, but we do so for the purpose of correcting what we believe to be a misapprehension. The classification of active and representative members has given rise to a suspicion in some quarters that the latter class are to outrank the former, and ultimately place the control of the association in the hands of new men. After a careful reading of the new constitution, we cannot discover any just grounds for such fears. With the single exception of measures involving the expenditure of money, the two classes stand upon an equal footing, so much so that the classification is little more than nominal. The representative members, to be sure, in the matter of standards vote by letter-ballot on the basis of the number of cars represented, but that is done outside and not in the meetings. And, moreover, there can be no letter-ballot voting outside until such vote has been ordered by a majority of all the members, irrespective of classes, each member casting one vote and no more. As regards money expenditure, the voting is according to the amount of money assessed and paid. There can be no inequality in this unless active members pay more than the regular dues, and this it is not expected they will do. There are two classes of voting members, but no upper and lower house, as some might suppose from seeing the names printed in separate lists. In order to avoid such an impression we put them all in one list, each name taking its place alphabetically.

Fears have also been expressed that some of the roads may appoint delegates to represent them who have no practical knowledge of car building. In such case one of two things would supervene. Either the appointments would be a nullity, or a very important clause of the new constitution would be wiped out. We do not think any such appointments are likely to be made by road officials

who have a proper regard for the interests of the association. We deem it highly important that there should be no falling off in the number of active or non-representative members, but, on the contrary, the number should be proportionately increased. Upon this element rests the integrity of the whole structure. The association has labored through all these years, and has become an arena where car-builders can come together, exchange views, and get information that can be obtained nowhere else. These inducements should be continued and made stronger, so that every car-builder who is fairly qualified for membership will be ready and eager to pay his dues, so as to be present at the meetings, knowing that if he attends he will be as well posted as the rest, and if he stays away he will drift towards the rear.

The great end in view is the adoption of such improvements in the construction and management of cars as will result in increasing the earnings of traffic by reducing operating expenses and the losses and casualties caused by accidents. Whether the association, under its new departure, will be able to make more rapid progress in this direction than it has made in the past will be apparent in a year or two. Should there be a considerable accession of representative and active members at the next annual meeting, and should a majority of the committees bring in reports which contain evidence of labor, research, and investigation, the outlook will certainly be hopeful and encouraging.

#### RAILROAD ACCIDENTS.

If a panorama or bird's eye view of the railroad tracks of the country could be exhibited, showing the moving trains of every description, and the direction and comparative speed of each train, the wonder would be that accidents of the horrible kind, or first-class, as they are sometimes called, are not of hourly occurrence instead of happening as they do at intervals of weeks or months. In referring to accidents of this class we do not take into account the value of property destroyed. There is nothing "horrible" about that. But it is the destruction of human life in modes as sudden, as cruel and as revolting as in any uncivilized warfare. To prevent these calamities entirely is out of the question. The time will never come when railroad disasters will be an unheard-of thing. But it would seem that the particular negligence or failure to make use of timely precautions that has been the direct cause of one accident, ought not to be the cause of another or subsequent one. Yet the fact that it is so is confirmed by constant experience, and is due not so much to the lack of rules, regulations and discipline, or to the imperfection of safety appliances of a mechanical nature, as to the great primary fact that the traffic of the roads has grown to such enormous dimensions that human skill and ability are unequal to the task of providing all the safeguards that are required for each and every emergency. The demand for transportation both for passengers and freight must be met, no matter what happens, or there is a loud chorus of complaint. People clamor more and more for frequent trains and higher speed. They insist upon being put through on time, night or day, blockade or no blockade, safe or unsafe. Imagine one of our lightning express conductors halting his train at a station at nine o'clock in the evening, as they sometimes do in Sweden, and informing the passengers that he will proceed again at daylight, as the night is so dark the engineer can't see the track a hundred feet ahead. Such an announcement on any of our own roads would instantly cause an indignation meeting and the reading of the riot act.

The management of our roads has devolved upon men who have been compelled to educate themselves under pressure, by deriving their experience from the work in hand. The growth of business has been in spite of the management rather than in consequence of it, and had not the plans been matured to meet every exigency, things would have come to a standstill. While some even of the more serious accidents which occur are due to causes which can not be foreseen nor provided against by finite intelligence, yet in the great majority of cases the cause is due to the absence of the most obvious and necessary precautions, and this again is due to neglect or incapacity on the part of employes and subordinates; or furthermore, an excess of responsibility may be imposed on them, or their duties may be more than they are physically able to perform. In such case the superior officers are at fault, and should be held accountable. It is their business to judge of the mental and physical capacity of the men they employ and place in positions where a transient forgetfulness, confusion of mind, inattention or drowsiness, will place a hundred lives in peril. The time will probably never come when automatic mechanical appliances will be so perfect as to take the place of eyes, ears, muscles and brains so entirely that trains will be kept from coming into violent contact without the exercise of individual judgment and watchfulness. The most effectual preventive of these catastrophes is to be found in the rigid enforcement of a well devised code of rules and regulations. This devolves on the road management, and it should be responsible in law when accidents occur from obvious defects in such code. Coroners' juries always, or nearly always, do their duty, and their duty as they and the public understand it, is to blame somebody or something; and if they can't

locate the blame exactly in the right place, to distribute it generally over the whole corporation. This procedure has been gone through with so frequently and with such trivial results, that it has become a kind of formality as indispensable in such cases as a piece of red tape to the regularity of a legal document. Neither are grand juries very eager to find indictments, nor are these bodies very sharply arraigned by the public for not doing so, because as respects the lower grades of railway service, it would not seem like even-handed justice to mete out exemplary punishment to the few whose temporary absent-mindedness or heedlessness was the direct cause of an accident, and permit the vastly greater number to escape who had yielded to these weaknesses many a time while on duty without causing an accident.

The London Engineer, in a notice of the exhibition of railway car, couplings which opened at Darlington, England, on the 3rd of October, says:

"It is felt that a great end has been gained in bringing together such a variety of railway coupling appliances, automatic and otherwise, from different parts of the world to a railway centre. Trials have been made and awards given by competent judges. The object of the exhibition was to give railway officials an opportunity of studying the different new methods of coupling, with a view to their adoption for the purpose of saving life. One point elicited by the exhibition is that the dangerous method of coupling in use in this country has been almost, if not entirely, superseded on American railways."

We infer from this that there is but one method of coupling in general use in England, which implies that the railway managers there have not got a very large assortment from which to make a selection. In this country it is quite otherwise. The variety is so great that a railway man who is a good judge of these devices can hardly fail to select a good one if he tries. The trouble is that the best of them are so good that it is quite a coincidence for any two roads to agree as to which particular one is the best. We do not know to what extent American inventions of this class were represented at the Darlington exhibition, but if there was any considerable number of those that are here regarded as among the best, it is not surprising that the English method, whatever it is, should be characterized as "dangerous," and that it has been superseded on American roads. We wish there could be such an exhibition here, so our railway officials could have an "opportunity of studying the different new methods," and that "trials could be made and awards given by competent judges." Notwithstanding the fact that accidents in the coupling of cars are still very frequent in our track-yards and elsewhere, from the use of imperfect devices, it is extremely difficult to induce the higher grades of railway officials to pay much attention to the "new methods" that are constantly being brought out by inventors. We can not but think that a great national or international competitive exhibition of these appliances would be productive of good results.

A correspondent asks our opinion of a freight car built for a 3-foot gauge road, and gives the following details of its construction:

"The trucks are of the Pennsylvania Railroad pattern, except that the top arch-bars are lipped over the bottom arch-bars. Side sills 5 x 12 in. x 31 ft. long; center sills 4½ x 9 in. x 31 ft. long; end sills 5 x 7½ in. x 7 ft. 8 in. long; body bolsters 5 x 19 in.; needle beams 10 x 4½ in. and placed on their flat. Body truss rods go through end sills and under all timbers, including body bolsters, with 6-in. queen posts bearing against needle-beams. The body bolsters are trussed with one rod running over the top and one under the bottom. End sills boxed into side sills with small tenons."

We could form a better opinion if we had the working drawings, and better still if we could see the car itself. The floor timbers are heavy enough, we should say, for carrying a 30-ton load. If the trucks are Pennsylvania "diamond" standard, they are strong enough, and will not be likely to sag much even if the arch-bars are not lipped. The lipping will be of service, however, when the trucks get old and the bolt-holes become enlarged. The needle-beams, or cross-frame tie-planks, are no stronger, we should say, than a 4 x 7 timber would be edgewise; but considering the uses they perform it is not very important, perhaps, which way they are placed. Running the body truss-rods under the bolsters is a marked deviation from ordinary practice, the advantage of which is not very clear. The bolsters are the sustaining points, or the abutments, of the floor frame, and upon these the truss rods should rest. As respects the bolster trussing, we can not see the necessity for having one rod running under the bottom of bolster, as is stated. Will our correspondent be so good as to send us drawings of his plan of trussing, or, what would be better still, drawings of the entire car, so we can see just how it is?

The most perplexing subject the Car-Builders' Association had to deal with in the revision of its constitution was that of patents. The more it was discussed the greater seemed to be the difficulty of agreeing upon any clear, well defined and satisfactory provision for future guidance in the matter of patented inventions. As it was imperative that something should be done in regard to the knotty problem, or else the new constitution would be incomplete, the subject was finally disposed of in a very brief clause, leaving the whole matter with the Executive Committee, by providing that no patented appliances shall be submitted to the association unless they shall have



been submitted to the committee, and the committee can use its utmost discretion in all cases. It can determine not only in regard to the merits of the invention as a mechanical appliance, but can use such means as may be necessary to ascertain the validity of the patent and all collateral claims, as well as the terms by which the right to use may be acquired. This is probably the best arrangement that could be made. While it relieves the association of the heated and profitless discussions that invariably attend the consideration of patented improvements, it imposes a burden of no trifling weight on the committee. Every inventor or patentee in the land who has got a device he wishes to introduce upon railroads, will know what will take it to. It will have to be put into the hopper of the Executive Committee before any definite or final action can be taken upon it by the association; and the discretion of the committee is without any restriction. The new constitution does not prohibit the discussion or recommendation of patented inventions by the association, but they can be recommended only with the implied concurrence or approval of the committee.

The daily papers of New York have been publishing announcements of the removal of General Superintendent John M. Toucey, of the New York Central & Hudson River road, in consequence of recent accidents on that line. We are assured that these announcements are entirely without foundation. There might be some little plausibility in such fabrications if it could be shown that these accidents, and more especially the recent tunnel disaster, were the result of any neglect by Mr. Toucey of his official duties. But no such showing has been made. A railroad superintendent can only be held responsible for what is fairly within the sphere of his legitimate authority. Beyond that he can not go. He can only make use of the means which the company authorize, and which are available at the time an accident occurs. The reputation of an officer who has for many years filled a highly responsible position as faithfully and as acceptably as Mr. Toucey has, should not be tarnished by the inconsiderate judgments of newspaper writers, greedy for sensational paragraphs that will make their papers sell, and knowing and caring little about the actual facts of the case.

The Boston Herald says the salaries of employes on the Vanderbilt roads are as follows:

Engineers are paid three cents per mile and firemen receive just one-half the rate. Passenger conductors are paid \$80 per month, and in some instances \$10 more. As the engineer has control of the brakes the old-fashioned brakeman is displaced by "trainmen," who help ladies to seats and also assist them in coming and going. These men receive \$50 per month, but the man on the last car receives \$5 additional, as his responsibility is greater. In case of any delay he must go on the track to flag approaching trains and may be left behind. Baggage men are paid \$60 per month and ticket agents (except in cities) \$50. This class is poorest paid of all railway officials, as they are closely confined and serve long hours, but there are so many women ready to accept such work that women's pay becomes the standard. The track boss is paid \$45 per month, while switchmen and flagmen have only \$36, and yet this is one of the most responsible positions on the road.

"ST. NICOLAS" is without a rival in juvenile magazine literature. Whether we regard the diversity of its subjects, the skill with which they are treated, or the marvelous excellence of its pictorial embellishments, it is charming, beautiful and instructive; a huge gem composed of lesser brilliants the luster of which is heightened by their skillful combination. We commend it to every body, and especially to the juvenile element in the family circles of railway men of every grade.

House Carpenter's Companion and Builder's Guide, is the title of a new pocket hand-book by W. A. Sylvester, containing a large amount of information that is indispensable to those engaged in house carpentry, whether master builders or workmen. It abounds in illustrations and descriptions of the different kinds of work, rules for estimating work, tables of weights of materials, the metric system of weights and measures, etc. It is a book which every workman should have. Published by A. Williams & Co., 283 Washington street, Boston. Pocket size, 114 pages, 35 full-page plates, cloth. Price \$1.25. Single copies mailed on receipt of price.

We have received from Messrs. Robert Clarke & Co., 61, 63 and 65 West Fourth street, Cincinnati, O., their Catalogue of American and Foreign Books relative to Applied Science. The Catalogue constitutes a thick pamphlet, with comprehensive and well-arranged matter brought down to the date of October, 1882. It embraces three parts: (1) Engineering and allied subjects; (2) Books on subjects relating to the numerous applications of water as a force; and (3) Shipbuilding, etc. This very useful work of reference is sent to any address on the receipt of a three-cent stamp.

SPEAR'S ANTI-CLINKER RAILWAY CAR HEATERS are so extensively used upon passenger lines throughout the country that it is almost superfluous to call attention to them. The features of the apparatus that are specially valuable are their durability, neatness, and the anti-clinker grate. The object of the grate is to remove the ashes and clinkers from the fire-pot without dropping it

fire out, which can be done with less trouble than by raking the old kind of stoves, and a continuous fire kept going in the mean time. The entire surface of the stove can thus be relied on for heat so long as there is any fire in it. The base of the stove is always hot, and a bottom as well as top view of the fire is afforded. The attendant, also, can always know when the fire needs raking. The stove is also a ventilator as well as heater, the cold air being introduced at the bottom, and from thence passing up on one side and down on the other, and becoming heated, it escapes through an opening at the base. This constant influx of fresh air, and a corresponding escape of heated air from the corner of the car, keeps up a regular circulation and also maintains a uniform temperature. There are 80,000 stoves of this kind manufactured yearly.

#### Inventions and Appliances Exhibited at the Car-Builders' Convention at Niagara Falls.

There was the usual exhibit of models and articles belonging to the general category of railway machinery and supplies. The following are the names of the principal exhibitors:

THE UNITED STATES TIRE ROLLING STOCK CO., of Philadelphia, exhibited an iron gondola car which has been in service for some time on the Pennsylvania Railroad. Its construction is an improvement upon the original Lamothe system. The longitudinal sills are of tube iron and the end sills of channel iron. Cars of this description are said to carry loads of 30 tons without deflecting the sills.

THE ELKINS MFG & GAS CO., Philadelphia.—Ajax Metal for Car Journal Bearings.

NATIONAL SAFETY CAR BEARING CO., New York.—Baker's Patent Universal Car-Axle Joint and Self-Adjusting Safety Bearing; and Automatic Lock.

EURANK'S AUTOMATIC SPARK-PROOF BOX CAR DOOR ATTACHMENT.—Eubank & Cook, Girard, Ill., or W. S. Caddy, General Agent, St. Louis, Mo.

ROCHESTER CAR WHEEL WORKS, Rochester, N. Y.—Car Wheels.

JAMES SPEAR, Philadelphia.—The Spear Anti-Clinker Car Heater and Ventilator.

WM. F. CONDON & CO., East Saginaw, Mich.—The Condon Self-Extinguishing Car Heater and Ventilator.

JOHNSON BRAKE.—Manufactured by Josiah Wright, Springfield, Mass.

TROY MALLEABLE IRON CO., Troy, N. Y.—Refined Air Furnace Castings.

TALLMAN AUTOMATIC BRAKE CO., New York.—Automatic Brake for Freight Trains.

CHICAGO CAR ROOFING CO., Chicago, Ill.—Galvanized Corrugated Iron Sectional Car Roofing.

HENRY D. GOLDSMITH, New York.—Triple-Acting Automatic Car Coupling.

WIDFIELT & BUTON, Uxbridge, Ont.—Automatic Freight Brake.

PAIGE & MIDDLETON, Philadelphia.—Lock-Nut for either Wood or Iron.

JOHNSON RAILWAY HEATER CO., Boston, Mass.—Railway Car Heater.

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UNITED STATES CONCAVE SPRING CO., New York.—Concave Elliptic Springs.

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CHERRY SASH HOLDER CO., Boston, Mass.—Car Sash Holder and Lock.

A. FRENCH & CO., Pittsburg, Pa.—Springs for Railway Cars.

PHATT & WHITNEY CO., Hartford, Conn.—Taps, Dies and Gauges.

J. B. SAFFORD, Buffalo, N. Y.—Safety Draw-Bar for Freight Cars.

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WILSON, WALKER & CO., Pittsburg, Pa.—Draw-Bars and Car and Locomotive Forgings.

W. V. PERRY, Chicago, Ill.—Safety Freight-Car Coupling.

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GARDNER & CO., New York.—Perforated Car Seats.

HICKS & SMITH, New York.—Car Lamps.

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AKRON IRON CO., Akron, Ohio.—Products of Manufacture.

BODINE CAR ROOFING CO., Mansfield, Ohio.—Car Roofs.

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#### Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur.

Boston, Hoosic Tunnel & Western.—J. L. Wellington has resigned the position of General Superintendent, and the office is abolished. J. L. Butman is Superintendent.

Boston, Revere Beach & Lynn.—Charles A. Hammond, late Master of Construction and Maintenance, has been appointed Superintendent.

Buffalo, New York & Philadelphia.—Robert M. Patterson has been appointed Superintendent of the Rochester Division.

Canadian Pacific.—Thomas W. Shaugnessy has been appointed Purchasing Agent. He is now General Storekeeper of the Chicago, Milwaukee & St. Paul.

Cincinnati, Hamilton & Dayton.—Albert Griggs has been appointed Superintendent, vice J. H. Barrett, resigned.

Detroit, Mackinac & Marquette.—D. McCol has been appointed General Superintendent, in place of Thomas McKeown, resigned.

Kansas City, Lawrence & Kansas Southern.—Frank M. Smith has been appointed Purchasing Agent, with headquarters at Topeka, Kan.

Lake Shore & Michigan Southern.—W. H. Canniff, Superintendent of the Lansing Division, has been appointed also Superintendent of the Ft. Wayne Branch, the former Ft. Wayne & Jackson road.

Mexican Central.—James N. Lauder, heretofore of the Northern N. Hampshire, has been appointed Superintendent of Motive Power and Rolling Stock.

Milwaukee & Northern.—N. S. Kimball has been appointed Master Mechanic, with office at Green Bay, Wis. He has been on the Chicago, Milwaukee & St. Paul.

New York, New Haven & Hartford.—Wm. H. Stevenson, heretofore Superintendent of the Shore Line Division, has been appointed Superintendent of the New York and New Haven Division, in place of John T. Moody, resigned. O. M. Shepard, recently of the New York & New England, succeeds Mr. Stevenson as Superintendent of Shore Line Division.

New York, Chicago & St. Louis.—G. H. Kimball is appointed Superintendent of Eastern Division, and E. E. Dwight, Superintendent of Western Division.

New York, Pennsylvania & Ohio.—N. F. Wood has been appointed Superintendent of the Mahoning Division.

Northern Pacific.—C. T. Hobart has resigned the position of Superintendent of Dakota Division, and J. T. Odell has been appointed in his place.

Pennsylvania.—Wm. B. Norris has been appointed Master Mechanic of Blairsville shops, vice C. B. Street, transferred.

Pittsburg, Cincinnati & St. Louis.—Charles Watts has been appointed Superintendent of Western Division, vice C. C. F. Bent; and W. W. Reynolds Master Mechanic of Second and Third Division, vice Geo. H. Prescott.

St. Paul & Duluth.—H. T. Simpson is now Acting General Superintendent in place of S. R. Simpson, resigned.

Texas & Pacific.—Perry Stevens has been appointed Master Mechanic of the Eastern and New Orleans Divisions, with office at Marshall, Texas.

Wheeling & Lake Erie.—C. Robinson Griggs is Lessee and Manager, M. D. Woodford, General Superintendent, and Lewis James, General Master Mechanic.

#### Employment.

Advertisements will be inserted under this heading for one dollar for each insertion.

WANTED.—A position in the machinery department of a railroad by a person who has had much experience as master mechanic and superintendent of machinery. Address NATIONAL CAR-BUILDER, Morse Building, New York, N. Y.

#### Back Numbers Wanted.

Our readers who may have May or September numbers of the CAR-BUILDER (1882) to spare, will receive 15 cents a copy for any they may send to this office.



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 BALTIMORE & OHIO RAILROAD CO., S. S. Hill, Purchasing Agent, Baltimore Md.  
 CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.  
 CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chicago, Ill.  
 LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.  
 NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.  
 NAUATUCK RAILROAD CO., O. W. Beach, Superintendent, Waterbury, Conn.  
 PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.  
 NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., R. N. Dowd, Commissary, New Haven, Conn.

UNION PACIFIC RAILROAD CO., A. D. Clark, Purchasing Agent, Omaha, Neb.  
 KANSAS  
 CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent, Chicago, Ill.  
 LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky.  
 GRAND TRUNK RAILWAY S. W. Wall, Port Huron, Mich.  
 LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.  
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 R. W. Ford, Pres. Nat'l Bank of Republic, N. Y.  
 R. T. Wilson & Co., Bankers, N. Y.  
 J. M. Crane, Cashier Nat'l Shoe & Leather Bank, N. Y.  
 W. B. Dimmore, Pres't Adams Express Co., N. Y.  
 H. R. Plant, Pres't Savannah, Florida & Western R. R., and Southern Express Co., N. Y.  
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been adopted by any Railway in the World. Our Steam Driver and Tender Brake is acknowledged to be the Simplest and Best Power Brake now in use

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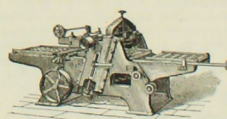
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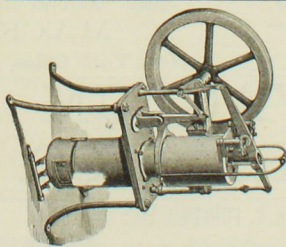
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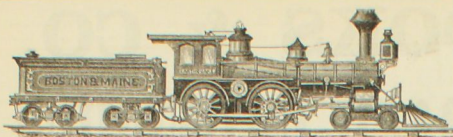
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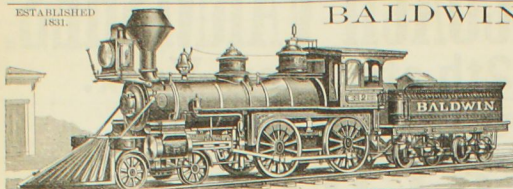
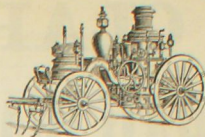






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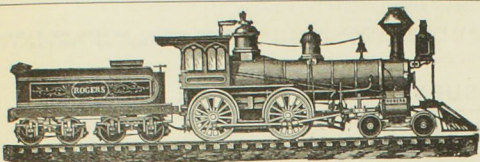
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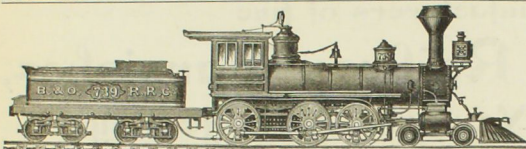
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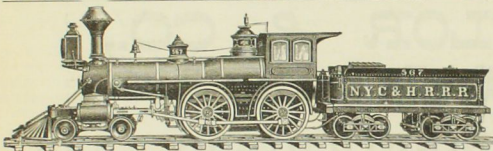
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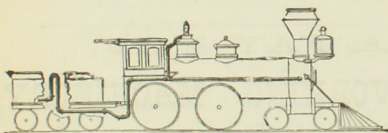
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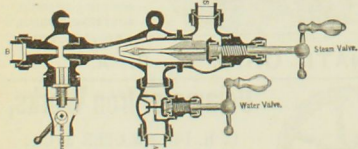


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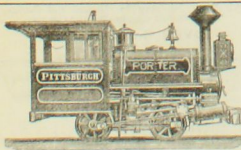


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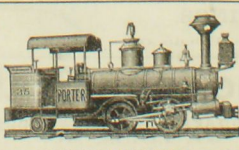
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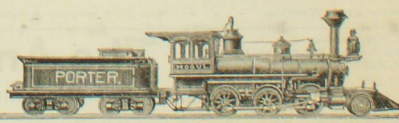
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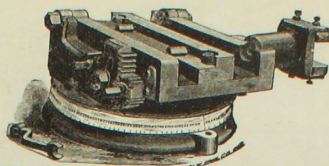
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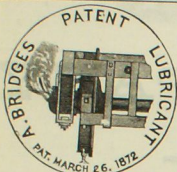
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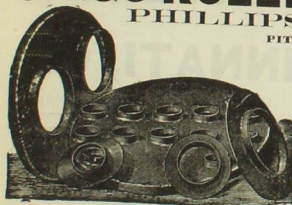
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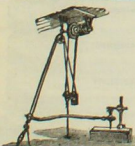


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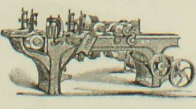
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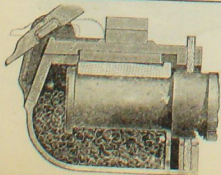


**HENRY A. LEE, Manuf'r, 164 Union St., Worcester Mass.**

## THE HEWITT BOX-LID CO.,

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We respectfully refer you to the following railroads using the Hewitt Cover:  
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R. & O. N. & E. & D. & L. & A. & G. & L. & E. & W. & L. & S. & D. & L.  
S. & C. & C. & O. & M. & L. & E. & T. & H. & S. & L.  
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### RUSSIA SHEET IRON,

For Locomotive Jackets and other Fine Work.

We sell the GENUINE imported article, which long experience has proved to be the most durable polished iron ever manufactured. It will not contract rust by mere exposure to the atmosphere.

Tin and Roofing Plates especially adapted for Railroad Car Roofs, Pig Tin, Zinc, Solder, Lead, Etc.

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RAILROAD SUPPLIES, CONTRACTORS' SUPPLIES, MACHINISTS' SUPPLIES, AND STEEL.

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SIMPLE, RELIABLE AND EFFECTIVE.  
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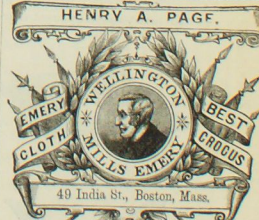
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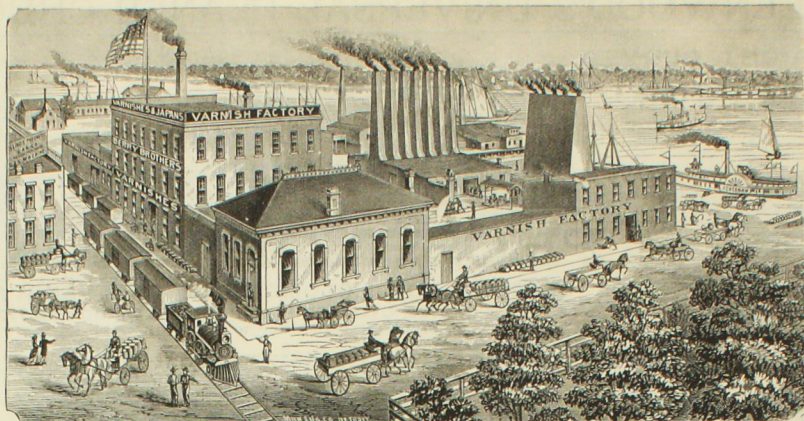
**BERRY BROTHERS,**DETROIT, MICH.,  
MANUFACTURERS OF**RAILWAY VARNISHES.**

ESTABLISHED IN 1858.

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RAILWAY VARNISHES.

Frontage on Wight Street, 218 ft.



Frontage on Lieb Street, 300 ft.

RAILWAY VARNISHES.

ESTABLISHED IN 1858.  
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B. R. MILLER, General Eastern Agent. W. L. EN EARL, General Western Agent.

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MANUFACTURED TO SIZES SPECIALLY ADAPTED FOR

**CAR-BUILDERS.**

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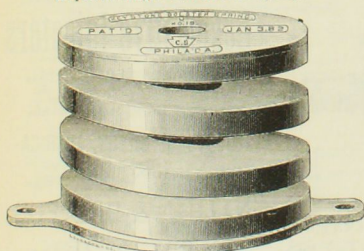
685--711 West 6th St.,

**CINCINNATI, O.**

Estimates and Price Lists Furnished.

NO. 10.

Keystone Single Coil Bolster Spring.

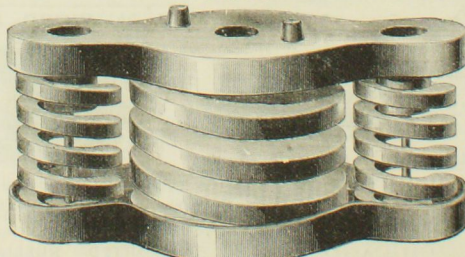
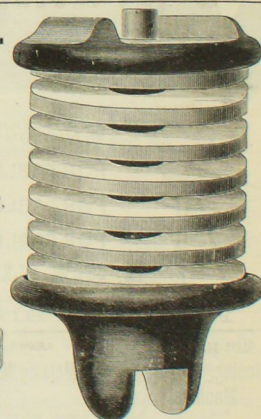
Patented August 16th, 1881, and January 3d, 1882.  
Capacity, 35,000 Pounds Each.  
Motion Very Soft and Slow.**KEYSTONE CAR SPRING WORKS.****CHARLES SCOTT.**

C. T. SCHOEN, Supt. MANUFACTURER OF

**RAILWAY CAR SPRINGS,**1,028 TO 1,038 NEW MARKET STREET,  
Philadelphia, Pa.

KEYSTONE GRADUATED BOLSTER SPRING.

NO. 17.

Capacity 40,000 Pounds Each—Motion Softer than Elliptics.  
Patented August 16th, 1881; January 3d and March 21st, 1882.

Patented January 3d, 1882.





ay R. R. 4-816 g. 372 m. 248 lo. 6.012 g. |

Chi. Div.: A. M. Richards, *Supt.*..Bloomington  
St. Louis Div.: T. M. Eates, *Supt.*..Reedhot  
Kan. Cy. Div.: O. Vaughan, *Supt.*.....Slat  
Wm. McPhail, *M. M.*.....Slat  
Chi. & East'n Ill. 4-8½ g. 248 m. 56 lb. 3.0

[illegible][illegible][illegible][illegible]

Owen Point Iron Co. R. R. 3 g. 15 m.  
 A. L. Tuman, *Gen. Man.* Plattsburg, N. Y.  
 J. M. Iwawis, *Supt. of M. M.* Crown Point, N. Y.  
 J. C. Sherrin, *in M. C. E.* Crown Point, N. Y.  
 Chamber and Pennsylvania R. R. 8-8 1/2 g. 13 m.  
 F. L. Burwell, *Gen. Supt. of P. & C.* Cumberland, Md.



# CLIFF & RIGHTER CO.

CHARLES DEW. GIBSON, PRES.  
GEORGE B. SLOAN, TREAS.

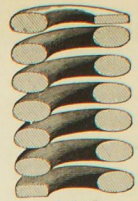
EDMUND K. RIGHTER, SECY.  
EDWARD CLIFF, SUPERINTENDENT.

MANUFACTURERS OF

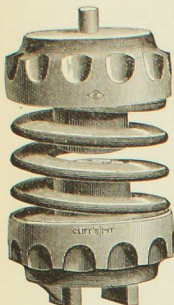
## Railway Car Springs,



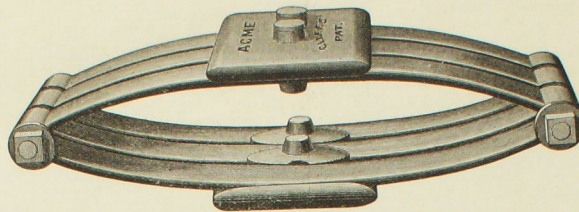
CLIFF BUFFER.  
5 1/2 by 8. 2 1/4 in. hole.  
Capacity, 10,500 lbs.



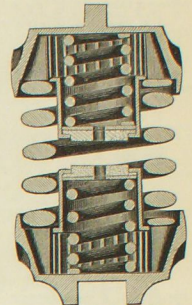
Sectional.  
CLIFF BUFFER.  
5 1/2 x 8. 2 1/4 in. hole.  
Capacity, 10,500 lbs.



CLIFF'S GRADUATED EQUALIZER.  
7 1/2 in. diam., 1 1/4 in. high.  
Capacity graduated from 7,000 to 10,000 lbs.



ACME TRIPLET FREIGHT ELLIPTIC.  
CLIFF'S PATENT, MARCH 29, 1881.  
22 in. long. 6 1/4 in. bearing to bearing.  
Capacity, 28,500 lbs.



Sectional.  
CLIFF'S GRADUATED EQUALIZER.  
7 1/2 in. diam., 1 1/4 in. high.  
Capacity graduated from 7,000 to 10,000 lbs.

MORSE BUILDING, NEW YORK.

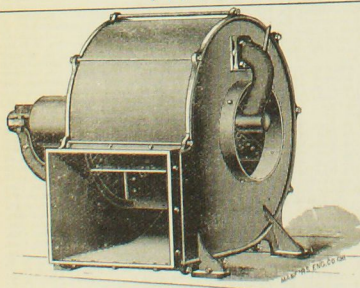
**IN THE PATENT FIGHT**  
BETWEEN  
**D. A. HOPKINS, of 113 Liberty Street, N. Y.,**  
PATENTEE AND MANUFACTURER OF  
**SELF-FITTING JOURNAL BEARINGS,**  
AND  
**T. V. LE ROY,**  
A SECOND DECISION WAS RENDERED JUNE 7, 1881,  
**IN FAVOR OF HOPKINS.**

The closing paragraphs of said decision read as follows:  
"As the proofs stand, therefore, Hopkins was the first to conceive, the first to disclose to others, the first to embody in models, the first to reduce to practice, and the first to apply for a patent. Le Roy was first to obtain a patent, but under circumstances which do not give him the prima facie case which a patent usually implies."  
"We must find priority of invention to be with D. A. Hopkins, and affirm the examiner's decision."

H. H. BATES,  
R. L. B. CLARKE,  
R. G. DYRENFORTH,  
Examiners-in-Chief.

### WILSON, WALKER & CO.

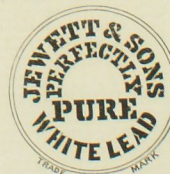
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**RAILROAD CAR AND LOCOMOTIVE FORGINGS,**  
PITTSBURGH, PA.



BENJAMIN, FISCHER & MALLERY,  
MANUFACTURERS OF  
**WOOD-WORKING MACHINERY.**

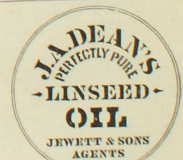
SPECIALTIES:  
Triumph Planing Machines, Siding and Re-sawing Machines, Shaving and Re-sawing Machines, Automatic Knife Grinders.  
ESTIMATES GIVEN  
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WHITE LEAD for the last twenty-four  
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perfectly pure

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teed absolutely pure  
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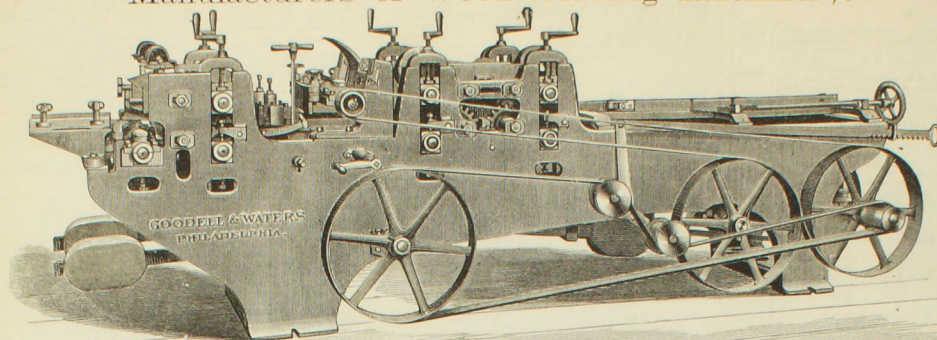
## xix

The image shows the front cover of an old book. The main part of the cover is a dark, possibly black or very dark brown, material with a fine, pebbled texture. Along the left edge, there is a vertical strip of a different material, likely leather or a lighter-colored cloth, which is heavily worn and discolored, showing shades of tan and brown. The spine of the book is visible on the right side, showing a similar dark, textured material. The overall appearance is that of a well-used, antique volume.



# GOODELL & WATERS,

Manufacturers of Wood-Working Machinery.



KEYSTONE RAPID FEEDING FLOORER

For RAILROAD SHOPS, CAR-BUILDERS, PLANING-MILLS, BRIDGE BUILDERS, SASH, DOOR and BLIND MAKERS.  
SEND FOR NEW CATALOGUE.

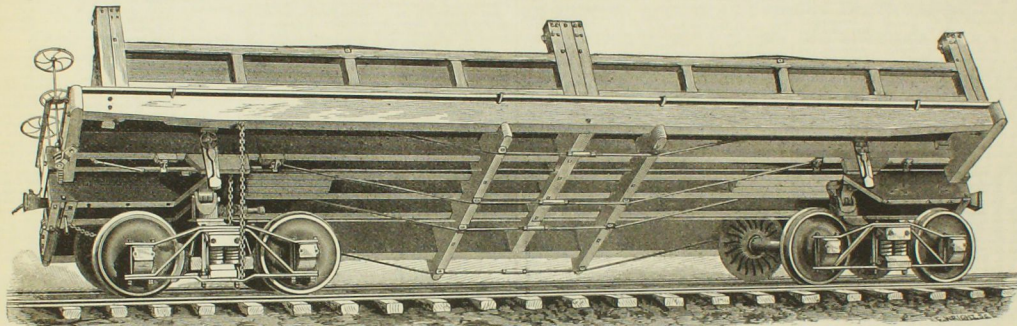
GOODELL & WATERS, Thirty-First and Chestnut Streets, Philadelphia, Pa.

## THE U. S. CAR CO.'S SCREW LEVER DUMP AND COAL CAR.

SIMEON BROWNELL, President and General Manager.

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M. VAN WORMER, Superintendent.



(M. VAN WORMER PATENTS)

This car has a capacity of eighteen to twenty tons, and can be handled by one man, discharging its load instantly. The device can be applied to flat and grain cars. The car is under perfect control at all times, and can be held at any elevation or dumped suddenly if desired. For construction trains, cars with this device would be invaluable. The mechanism is strong, simple and durable. The following railroads and car-builders are building cars with this screw lever attachment, viz.:

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Lehigh Valley Railroad.  
Main Central Railroad Co.  
Hillmeier & Smith Co., York, Pa.

Northern Pacific Railroad Co.  
Joliet Steel Co., of Chicago.  
Columbus, Hocking Valley & Toledo  
Railway.

Wells & French Car Co., Chicago.  
Cleveland Rolling Mills Co., Cleve-  
land.  
John L. Gill, Jr., Car Co., Pittsburgh.

Rock Island & Mercer County Rail-  
road.  
Ontario Car Co., London, Ontario  
Canada.

UNITED STATES CAR COMPANY, 48 CONGRESS STREET, BOSTON, MASS.

## THE SALMON CAR HEATER

"36 per cent. of coal saved and the car kept noticeably warmer!"

by using THE SALMON CAR HEATER.

It Insures Safety from Fire in case of Accident,

Economy in Fuel and RAPID CIRCULATION.

It heats quickly, is SELF-REGULATING, and can be  
used for either STEAM OR HOT WATER.

The Water Tubes do not come in contact with the Coals, but occupy the Smoke Flue  
in such a manner as to absorb the greatest amount of heat from Coal in a low state  
of combustion without danger of chilling the fire.

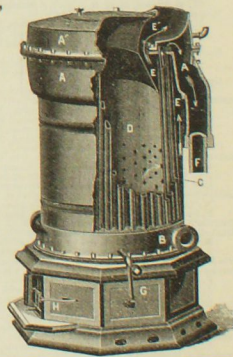
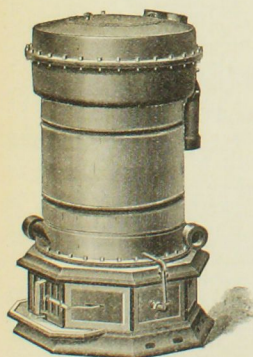
Once filled with coal the fire will last from 24 to 60 hours, according to weather,  
without replenishing, as proved by actual test.

At the last "Mechanics' Fair" it received the Silver Medal, being the highest award  
to heaters of any kind.

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AVO. DUCKWITZ, President. WM. F. DUCKWITZ, V.P. and Manager. F. H. DUCKWITZ, Sec. and Treas.

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The best wearing metal for Locomotives and Car Axle Bearings now in use. It is as near Anti Friction  
as metal can be made, while it retains all the strength of the Strongest Bronze. It is especially adapted  
to the use of Railroad Companies, Car and Locomotive Builders and Machinists.

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A close-up photograph of the fore-edge of a book. The binding material, likely dark leather or cloth, is visible on the right side. The edges of the pages are visible on the left, showing some wear and discoloration. The book is placed on a dark surface.



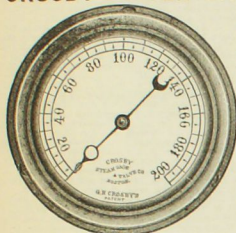
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**RAILWAY CARS OF ALL DESCRIPTIONS,  
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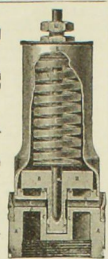
**CROSBY STEAM GAGE & VALVE CO.,**



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STEAM GAUGES  
AND POP SAFETY VALVES.**

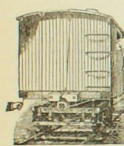
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Adopted by the Largest Locomotive Builders and Railroads in the United States.



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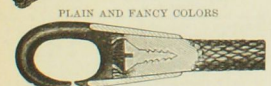
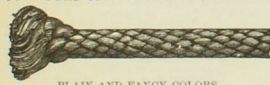
**The Perry Safety Freight Car Coupling,**



Several thousand of them are at work on the E. & T. H. C. & E. L. C. R. I. & P. T. H. L. C. T. & M. C. St. P. M. & N. L. N. R. S. M. Fitchburg N. Y. P. & O. H. & C. W. Conn. R. C. V. N. Y. O. & W. N. Y. W. S. E. & O. T. R. N. Y. N. H. & H. N. Y. C. & H. R. N. Y. & N. E. N. Y. L. E. & W. D. & N. Naugatuck & Housatonic Railroads. One of these roads have adopted it for their freight cars. Trial lots may be had without royalty. Office of the Company, 230 La Salle Street, opposite of western entrance to Grand Pacific Hotel.

L. MOORE, Secretary. W. V. PERRY, Gen'l Agent

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BELL CORD & BELL-CORD COUPLINGS**



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**SILVER LAKE CO.**  
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U. S. OR SELLERS & WHITEWORTH  
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AWARDED THE FIRST PREMIUM OF A SILVER MEDAL



AT THE  
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who are also builders of the  
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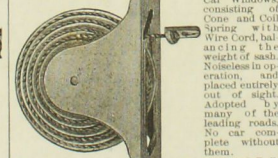
**JOYCE, CRIDLAND & CO.,**

Cor. Wyandotte St. and  
Railroad,  
DAYTON, O.,

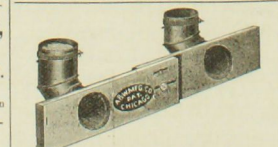
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We make 27 varieties of these Jacks, and have more in process of construction. Send for Illustrated Catalogue and Price List.

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WINDOW VENTILATOR**  
FOR RAILROAD OFFICES.

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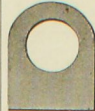
**THE ADAMS & WESTLAKE MFG. CO.,**  
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FOR POWER MOULDING MACHINES**

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**HARD & FLEXIBLE VULCANIZED FIBRE.**  
Flexible Vulcanized Fibre Dust Guards  
and Oil-Box Covers,

being absolutely unaffected by oil or heat, are far more durable and efficient than Leather, and much cheaper.

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**BACON BROS.,**  
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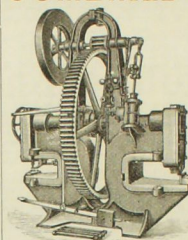
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Twenty-Ninth and Railroad, Pittsburgh, Pa.

**COMBINED PUNCH AND SHEAR,**



BUILT BY  
**HILLES & JONES,**  
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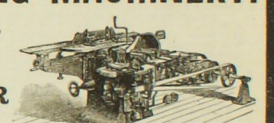
The annexed cut is taken from our No. 4 size, with Engine attached for driving. Pulleys are in all cases supplied unless engine is especially contracted for. The Shear runs at all times when the bell is on the tight pulley, but the punch end can be stopped and started by a clutch, and for very particular work the hand wheel is used to set the punch to mark before throwing in the clutch. The stripper is adjustable to different kinds of iron. Either punch or Shear supplied separately. FIVE sizes.

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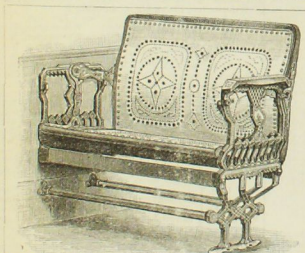
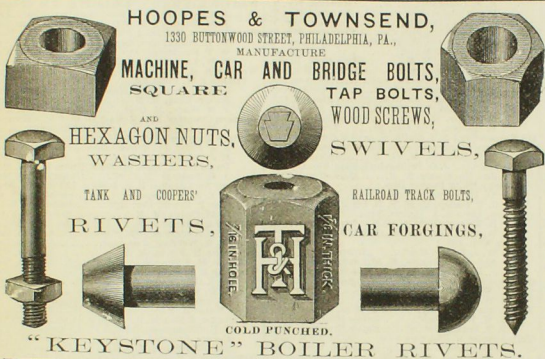
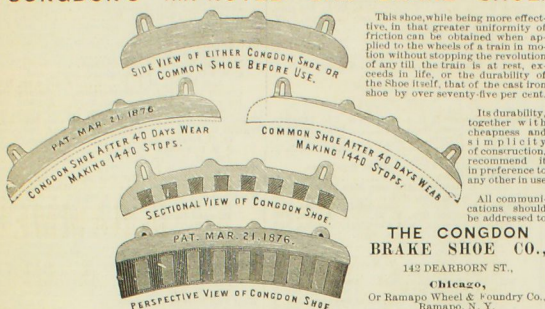


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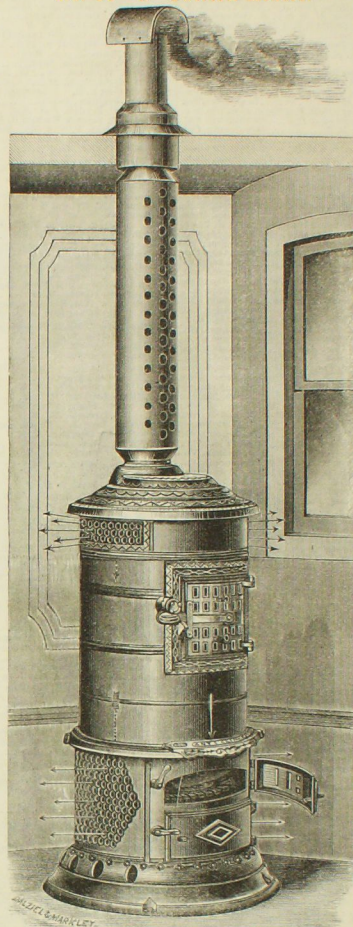


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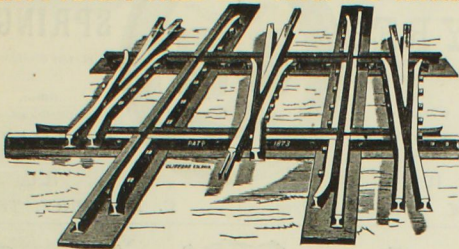


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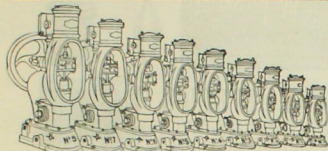
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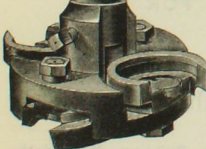
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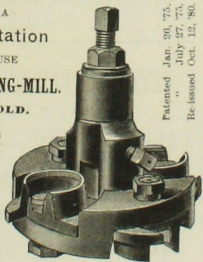
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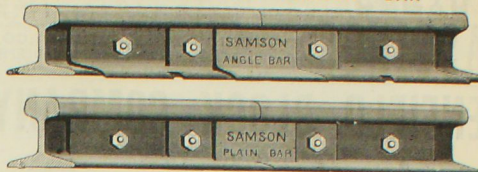


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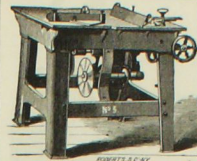
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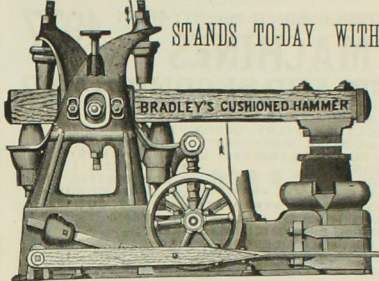
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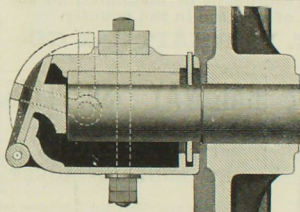


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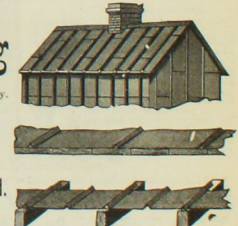
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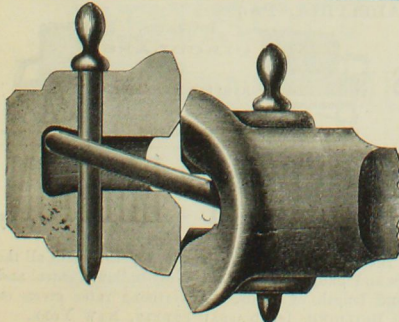
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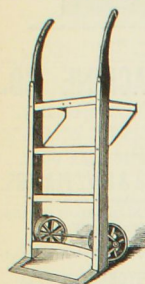
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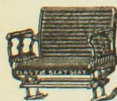
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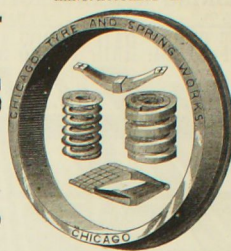
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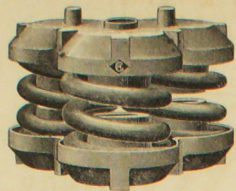
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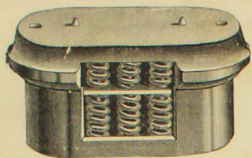
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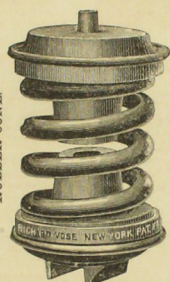
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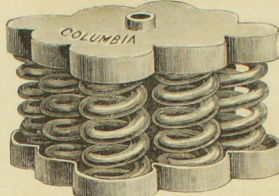
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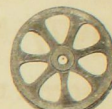
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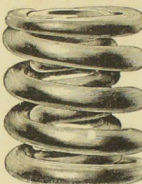
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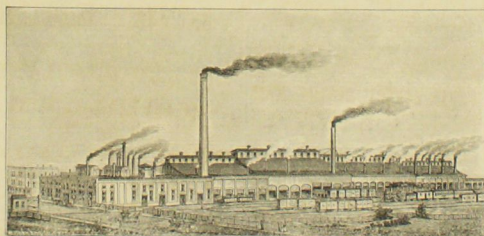
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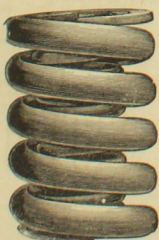
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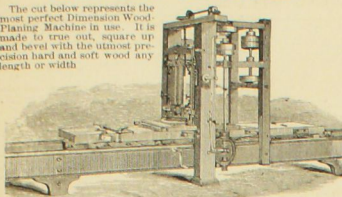
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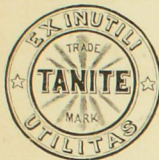
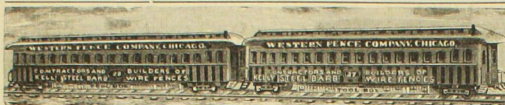
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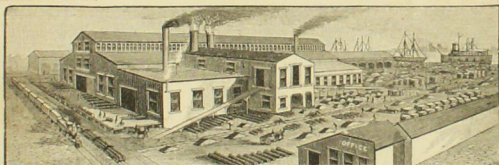
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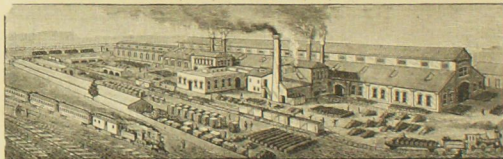
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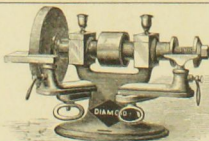
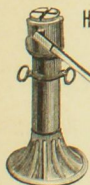
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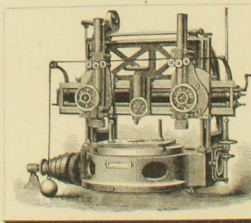
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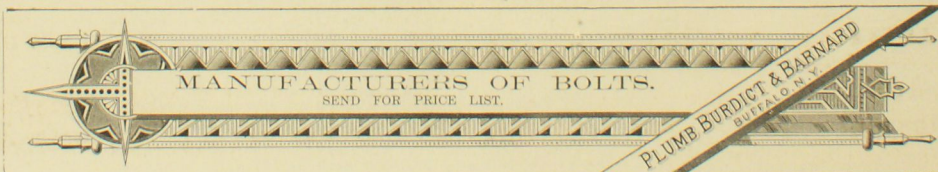
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